THE METAL INDUSTRY

WITH WHICH ARE INCORPORATED THE ALUMINUM WORLD, THE BRASS FOUNDER AND FINISHER, AND ELECTRO-PLATERS REVIEW.

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CONTENTS.

THE MANAGEMENT OF THE SILVER BATH.

Many platers seem to find more or less trouble in so managing the silver bath as to keep it in its proper condition, inasmuch as the troubles experienced with the silver bath from a frequent subject of inquiry. It is the habit of some platers to work with a highly concentrated solution. This practice should not be indulged in, inasmuch as such a solution at its best does not give any better results and frequently much poorer ones than one of normal strength, say which contains 3 to 4 oz. of silver to the gallon of solution. It is moreover quite an extensive procedure to carry so much valuable metal locked up in the bath, especially as it serves no practical useful purposes. Furthermore any troubles which are liable to occur, manifest themselves much more quickly with a concentrated bath, which is much harder to manage than one of moderate strength It is not a very difficult matter to keep a silver bath in proper trim, as the condition of the electrodes and especially that of the anodes, point clearly towards the source of any trouble which may develop. If the solution is of the proper constitution to give the most satisfactory results, the anodes, if no work is being plated, should take on a white color and have a bright appearance. If they do not do so and show a dull or discolored surface, there is a deficiency of cyanide in the solution. This latter should be remedied by the gradual addition of small quantities of cyanide until the anodes assume their proper appearance. A more advanced stage of this deficiency is indicated when the anodes show a brown color, when the work is being plated, which is usually coupled with the sluggish working of the bath and the bad appearance of the deposit. On the contrary, if the anodes cover themselves with a blackish looking deposit, the indications point to a deficiency of silver in the solution, which should at once be remedied by the addition of some of the metal, as the trouble may become much more acute if this is not done. When the solution is in the proper working order for plating, the anode while plating is carried on, should only at the most assume a slightly darker shade than the natural color of the metal, that is to say, it should have a sort of gray appearance. By observing the above mentioned indications, the intelligent plater should not have much trouble in keeping his silver solution in proper working trim.

THE CASTING TEMPERATURE.

The great and important bearing of the temperature at which alloys are cast upon the mechanical properties of the resulting metal has been emphasized in these columns at various times. It is a subject, however, which is well worth repeating, considering the many failures of metal to pass a required test which can be traced to this cause. While it was known in a general way that such were the facts in the case, no exact data were available on the subject until Mr. P. Longmuir carried out his experiments, which were briefly referred to in THE METAL INDUSTRY, December 1904, page 195. In the article, which he himself contributes to THE METAL INDUSTRY, and the first part of which is printed in this issue, Mr. Longmuir gives a detailed account of the manner in which he carried out his experiments and the results he obtained.

Among the many interesting results which are apparent from these experiments, one of the most surprising is the fact that castings poured at different temperatures after having been taken from the fire do not differ in their chemical composition, though a crucible filled with molten brass constantly gives off fumes of zinc oxide on standing. The conclusion that the loss of zinc is therefore only determined by the highest temperature which has been reached during melting has an important bearing upon the question of loss in melting. The microscopic investigation is also of considerable interest, inasmuch as it furnishes a clue to the different behavior of metals, cast at different temperatures, by showing, that too high a temperature gives rise to a loose structure, ill-developed in respect to crystals, while a low casting temperature produces very sharp crystals, easily fractured. It is only the fair temperature, midway between these extremes, which gives rise to the necessary interlocked structure, which gives the highest tensile strength. Mr. Longmuir has carried out his experiments in a very thorough and able manner and his article deserves to be read carefully and pondered over by every brass founder who is interested in the progress of his calling.

COLORING VALVES.

To obtain a particularly pleasing color on valves is the desire of most valve manufacturers, and the method of obtaining this color was described in the Correspondence Department of the April number of THE METAL INDUSTRY. The method, briefly told, is to allow the valves to remain in the sand a sufficient length of time before blowing out in water. The practice of some of the largest and best foundries is to accurately time the period that the valves should be left in the sand to get the desired color and, when this is once determined to immediately douse the casting in water. The plunging of the valve into the water tank the instant it is taken from the mold, so as to give the air no chance to get at it, is necessary for the success of the operation.

THE SILVER AND PLATED WARE INDUSTRY OF CONNECTICUT.

Some interesting data concerning the status of the silver and plated ware industry of the State of Connecticut are contained in the recent Annual Report, issued by the Connecticut Bureau of Labor Statistics. The data included in the report were furnished by 32 manufacturers. The average number of persons employed during 1904 was 3,658, which shows an increase of 7.3 per cent. when compared with the number employed during 1904, which was 3,410. The average number of days in which the works were in operation was 295.3. The amount in wages paid in the industry during the year 1904 was $1,951,077.55. The latter figure shows an increase of 9 per cent. of that paid in 1903, which amounted to $1,790,726.02. The average weekly hours of labor were 55.8, and the average annual earnings $533.37, which latter figure shows an increase of 1.6 per cent. over the average amount earned in 1903. The average daily earnings amounted to $1.81. The gross value of the manufactured product during the year 1904 amounted to $6,638,632.95, thereby showing a decrease of 10.9 per cent. in value, as compared with the year 1903, when it amounted to $7,450,890.10. The per cent. labor cost of the gross value of the product in 1904 was 29.4. The percentage cost of material, interest, insurance, taxes, rent, miscellaneous expenses and profit amounted to 70.6. There was consequently an increase of 6 per cent. in the proportion of product value which went to labor in this industry and the value of product was $1,814.83 for each person employed.

UNIFORMITY OF CRUCIBLE SIZES.

We are informed that for the first time in the history of the industry, all of the crucible manufacturers were represented at a meeting held in New York on March 24th, at the Hotel Astor. The crucible men talked over prevailing business troubles and they adjourned to meet again. There is one subject which is of much importance to the crucible manufacturer as well as to the users, which we would earnestly recommend to the consideration of the manufacturers. We refer to the uniformity and standardization of crucible sizes. THE METAL INDUSTRY has been an earnest advocate of such standardization for some time past, and it has dwelled upon the wide spread demand on the part of the users for its adoption. About all of the crucible manufacturers are in favor of the standard size of crucibles on general principles, but they have never been able to agree as to which firm makes the standard size or what standard size should be adopted. Now that they are holding friendly meetings, they may be able to agree on a uniform size, so as to benefit alike themselves and the melters.

The total world's production of spelter in 1904 amounted to 609,971 long tons, of which 157,901 tons were produced in the United States.

VARIATIONS IN THE PROPERTIES OF ALLOYS.

By Percy Longmuir.

I.

All brass founders are familiar with the occasionally erratic behavior of alloys which have been produced under apparently identical conditions. Some years ago the writer, whilst engaged in the production of high pressure fittings, had this fact very forcibly demonstrated by a result, which led to an extensive investigation of the "variables" entering into the production of alloys. This examination included the influence of pattern design, variables entering into moulding, methods of gating and casting and changes occurring in the alloy during melting. Generally speaking, faults due to any of the foregoing causes are evidenced either before the casting leaves the foundry or at any rate on machining. Chemical charges induced by melting are detected by chemical or microscopical analysis. It therefore follows that for the majority of faults a cause may be found, but there are times when castings go wrong and the most careful examination fails to reveal a reason for their doing so. For instance castings apparently perfect to the eye sometimes fail on steam or water trial or test bars which when turned appear equally perfect not infrequently fail to show the desired mechanical properties. To the brass founder such failures are far more distressing than an outright waster so bad that the cause is self-evident.

As an illustration of variation in mechanical properties the following may be quoted:

Thirty separate melts were made from one alloy, the composition of which was practically constant throughout. Several test bars from each melt were machined to size, the finished pieces presenting no difference, being of uniform color and all sound. The testing machine, however, showed huge differences, to show which it is only necessary to quote the lowest and highest results obtained, each value being the mean of the several bars representing one melt.

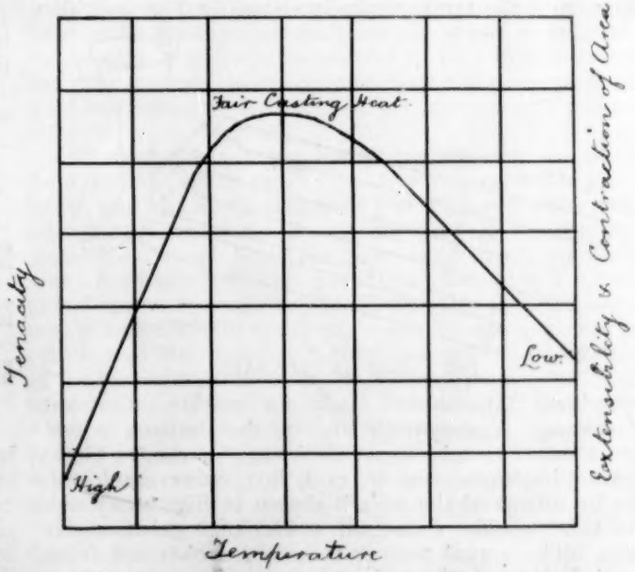
	Maximum Stress Tons per sq. in.	Elongation % on 6"
Lowest	12	5
Highest	28	51

These values, of course, represent two extremes, and many intermediate ones were obtained. In these experiments chemical analysis detected no difference to account for the wide difference in properties; further oxidation or absorption of gases did not enter into the question. In fact, particular care was taken in order to ensure that only one source of variation could occur, apart from which all conditions throughout the thirty experiments were as nearly uniform as is possible to attain in ordinary foundry practice.

The following examples are of some interest in this study of variables. Test bars from a heavy bronze casting failed to meet a specification of 18 tons tensile strength and an elongation of 16%. This casting broken up, remelted and recast more than met the foregoing requirements. A gun metal casting which should have shown a tensile strength of 14 tons per square inch and an elongation of 7½% on two inches actually gave a tensile strength of 6½ tons and an elongation of 3¾%. The same casting on remelting gave a tensile strength of 15 tons and an extension of 10%.

The two last examples give a clue to the variations quoted earlier, and this clue is simply and solely the temperature of the metal as it enters the moulds. Naturally a fault due to extremely low casting temperature, as represented by pasty metal, is at once evidenced in the casting; but within the range of perfect fluidity much temperature variation is permissible, and this variation has a corresponding influence on the mechanical properties. This may be readily tested by heating a crucible of ordinary steam metal alloy up to a high initial temperature and casting from it a series of valve bodies at short intervals from the high temperature down to the lowest one consistent with fluidity. Under such conditions each casting will represent a distinct temperature, and if the contents of the crucible are stirred before each cast, the composition will be uniform throughout. Such a series of castings tested by water at 1,500 lbs. pressure will at once show the influence of varying casting temperature. If plain bars are substituted for the foregoing valve bodies and castings obtained at intervals of half a minute starting from the high down to the low heat, similar variations will be found in the tensile properties. In other words, the tensile properties will be found to rise with a falling casting temperature until a fair casting heat is reached, from which the properties will again steadily fall. Many of these experiments on almost every variety of alloy have been made by the writer and in no case has the influence of varying casting temperature failed to show on the mechanical and steam or water resisting properties of the alloys. Plotting these results a

Fig 1



curve similar to Fig. 1 is obtained. This curve is applicable to practically any type of copper—tin or copper—zinc alloy. The highest point of this curve corresponds to the fair casting heat, that is, the casting temperature at which the maximum properties of any given alloy are to be obtained. It will be evident that the range of this fair casting heat is determined by the mass of the molten alloy; for with a 25 pounds crucible the contents of which naturally cool quickly the

fair heat would be represented by a sharp point or narrow time limit. On the other hand, with the contents of a ten ton ladle slowly cooling, the fair heat would represent a proportionately wider range of time.

II.

The foregoing statements are based on many trials conducted under normal foundry conditions, and as such they may be readily tested in any foundry. They are indicated here in that they served as a starting point for a wider investigation, in which whilst working on a strictly scientific basis every endeavor was made to keep the practical point of view uppermost. Thus no experiment represents a less weight than 50 pounds, each test reported represents the mean of two concordant determinations, and the analyses represent not the composition charged, but the actual analysis of the resulting castings. The method of measuring the temperature is shown in Fig. 2, which

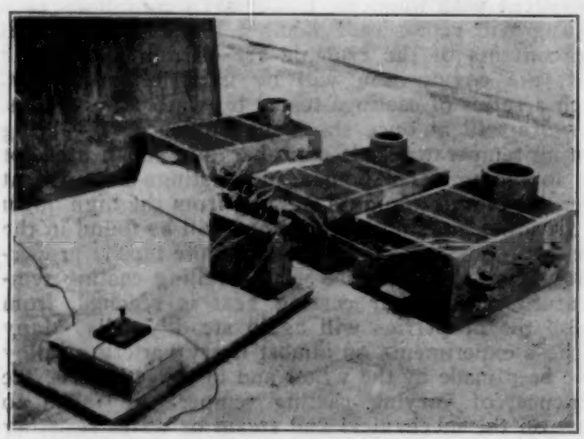


FIG. 2.—METHOD OF MEASURING CASTING—TEMPERATURE.

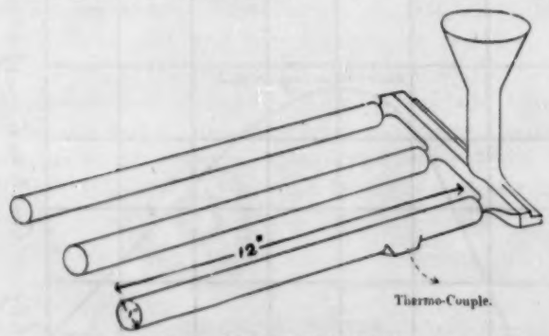


FIG. 3.—SET OF TEST BARS.

reproduces three boxes ready for casting. One set of castings is shown in Fig. 3, the position where the thermo couple entered being marked. Three thermo junctions, one to each box, were employed, and by means of the switch shown in Fig. 2 any one could be readily connected with the galvanometer leads. The actual temperatures were obtained from the deflection of the galvanometer. In casting, three distinct temperatures of "high," "fair" and "low" were obtained from each alloy. Thus each alloy was raised to the highest safe temperature, the crucible drawn, its contents stirred and one set of bars cast. The crucible then stood until the temperature had fallen to what in the author's opinion was a fair casting heat and, after stirring, the second set of bars was poured. The third set represents the lowest safe temperature consistent with fluidity. Each representative temperature was measured as shown, and the reason for stirring before each cast is obvious.

Naturally the first question is that of variation in chemical composition. A crucible of molten brass whilst standing emits fumes of zinc oxide and at first sight it would appear that the castings representing different temperatures would differ chemically. Such, however, is not the case, and careful analytical examination has proved that the composition does not vary, the three sets of castings always being precisely the same chemically. This is interesting in that it points to the loss of—zinc for instance—being determined by the highest temperature reached, and from which down to solidification no further loss occurs. Therefore, zinc fumes given off during cooling represent oxide formed on heating. Every condition except one being identical and there being no chemical difference, it follows that any variations found in properties are due entirely to difference in casting temperature.

A type of high quality steam metal in British practice is formed of copper 88%, tin 10% and zinc 2%, and the following results are characteristic of many experiments on this type of alloy.

Analysis			Casting Temperature ° C.	Max. Stress Tons per sq. in.	Elongation % on 2"	Reduction of Area %
Copper %	Tin %	Zinc %				
87.5	10.9	1.8	1178°	8.37	5.5	4.23
			1069°	14.83	14.5	16.71
			965°	11.01	5.0	6.36

A usual specification for castings of the foregoing alloy is a tensile strength of 14 tons per square inch, an elongation of not less than 7½% on 2 inches whilst steam fittings must pass a water test of 1,700 lbs. Evidently the first and third castings would hopelessly fail to meet such a specification; yet the three were poured from one 60-lb. crucible, and the middle one is separated from the first and third by the narrow time margin of only two minutes on either side.

The following table embodies results obtained from copper-zinc alloys:

Alloy	Analysis		Casting Temperature °C	Max. Stress Tons per sq. in	Elongation % on 2"	Reduction of Area %
	Copper	Zinc				
Red Brass	89.8	10.2	1308	6.85	13.2	12.65
			1073	12.64	26.0	30.28
			1038	5.67	5.6	6.94
Yellow Brass	73.0	26.0	1182	11.48	37 7	31.40
			1020	12.71	43.0	35.66
			850	7.44	15.0	15 25
Muntz Metal	58.6	40.5	1038	12.45	6.0	10.60
			973	18.88	15.0	16.10
			943	16.28	9.5	14.81

The results obtained from the red brass alloy which is largely used as a brazing metal are of special moment, and it will be noted that a fall of 235° C. in casting temperature doubles the mechanical properties; whilst a comparatively slight further fall results in a very considerable lowering of these properties. The yellow brass results follow the same order, but here the fair casting heat appears to extend over a wider range for the two first results are not greatly different. The third one, however, speaks very powerfully as to the influence of a low casting temperature. The susceptibility of a high zinc alloy to variations in casting temperature is well shown in the Muntz metal results. Each of the foregoing alloys being constant in composition and every condition

save that of casting temperature being identical, it necessarily follows that variations in mechanical properties are determined solely by variations of initial temperature.

Taking another feature, that of specific gravity, values obtained from the foregoing alloys will be found in the following table:

Alloy.	Casting Temperature ° C.	Specific Gravity.
Gun Metal	1173.	7.2563
	1069	8.2183
	965.	8.5101
Red Brass	1308	8.2768
	1078	8.5565
	1058	8.5372
Yellow Brass	1182	8.0533
	1120	8.1089
	850	8.1418
Muntz Metal	1038	7.7844
	973	8.0313
	943	8.3508

It will be noted that generally the densities of each alloy increase with a falling casting temperature. Another aspect of this is shown in Fig. 4, which reproduces the runner heads of the gun metal castings. The high temperature head not only shows no "feed," but actually presents an expansion or "swelling," as shown by the ring of metal running two-thirds of the circumference of the head. The fair heat shows uniform feeding in all directions, the head being originally the same diameter as the first one, but during the process of uniform feeding it has lessened by settling down the funnel-shaped head mould. The third head shows that feeding tends to take the form of a central pipe. The practical value of these features is easily recognized, for castings attached to such a head as No. 1 will, when tested under water pressure, yield results decidedly inferior to similar castings from heads such as No. 2. The feeding of No. 3 tending to take the form of a central pipe will give rise to local defects in the heavier parts of the casting familiarly shown in the form of "draw holes."

1, High. 2, Fair. 3, Low.

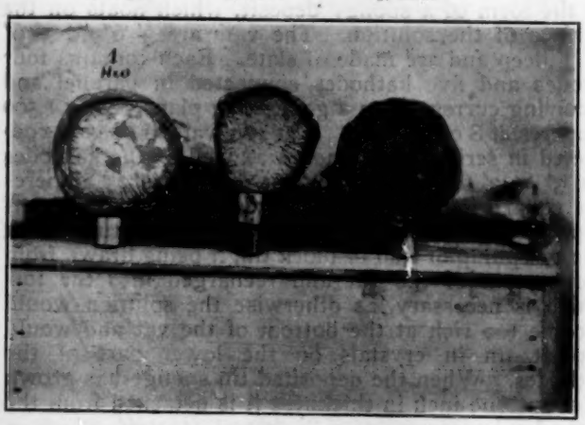


FIG. 4.—GUN METAL RUNNER HEADS IN ORDER OF CASTING.

(To be continued.)

ACID RESISTING MIXTURES.

The question of what mixture is best to be used when resistence to acids or chemicals comes into consideration, is not an easy one to dertermine. In general, of course, it is well understood that a certain percentage of lead is a necessary constituent of such an alloy. A mixture which has been giving good results in acid mine waters containing blue vitriol (sulphate of copper) consisted of:

	Per cent.
Copper	85
Tin	10
Lead	5

The copper in this mixture may be decreased to 80 per cent and the lead content increased to 10 per cent. Another mixture which has been recommended and worked well in some cases is composed of:

	Per cent.
Copper	63
Lead	30
Antimony	7

The antimony being added to help the combination of copper and lead.

For all ordinary purposes in the case of the weaker acids and not especially corrosive chemicals, a mixture of the following composition should be found suitable:

	Per cent.
Copper	86
Tin	7
Lead	3
Zinc	4

This mixture is close in composition to the ordinary valve metal and the metal is strong and close gained and can be readily worked.

THE ANODE IN THE GOLD BATH.

By Chas. H. Proctor.

It is customary to use platinum anodes in conjunction with gold where there is need of a larger anode surface. On account of the free solubility of gold in cyanide solutions, the bath with a relatively large gold anode would be enriched to such an extent, that for regular gilding the results would not be as successful as with a solution weaker in gold. This is about the only reason, as on account of the higher value of gold and platinum it would be just as cheap to use an all gold anode surface.

The writer has made many experiments in using hard rolled nickel anodes in conjunction with gold baths, and has found that they give just as satisfactory results as when platinum is used. In fact, the gilding appears to come from the bath very much brighter when hard rolled nickel anodes are used. Hard rolled nickel is very springly soluble in the regular nickel bath and in cyanide solutions there is scarcely any perceptible solution of the metal. It therefore proves itself one of the best metals used for the purpose mentioned next to platinum. Rolled nickel, C. P., about 1-16 in. thick, which is a suitable thickness for use, would cost about $1 per pound, while a relative amount of platinum would cost probably $240. The ecenomy in the cost of anode surface is thus sufficiently perceptible.

There are many firms in the watch case business in the United States who now use an alloy of gold and nickel in gilding their goods. They claim that in this way better results are obtained and a harder and brighter deposit is produced than by using other alloys. In Lyons, France, this method of gilding with nickel in conjunction with gold has been used for several years. The above method should be given a trial by interested parties, not only on acount of the money saved as compared with the cost of platinum, but on account of the satisfactory results, which may be obtained by it.

NICKEL ALLOYS—IVAR AND PLATINITE.

By an Occasional Correspondent.

Invar and Platinite are the names given to two specific alloys of nickel and steel, each having certain peculiar properties of expansion. The alloys of nickel and steel have certain properties of expansion possessed by no other known alloys. In fact, although the expansion of an alloy is generally obtained by the law of mixture, nickel-steel can possess a co-efficient of expansion very much higher, or very much lower than its constituents.

Messrs. Charles Edouard Guillaume and Louis Charles Dumas, both of France, have discovered that alloys of iron and nickel expand or contract under variations of heat in accordance with laws which are peculiar to such alloys, and which are generally very different from the laws governing the expansion and contraction of iron or nickel separately.

They have found by numerous experiments that by varying the proportions of nickel and iron in the alloy, products are obtained whose coefficients of expansion vary within considerable limits. For instance: When the proportion of nickel is less than about twenty per cent., the coefficient of expansion lies between that of iron and that of nickel; but this coefficient of expansion increases when the proportion of nickel is raised, until with twenty-two to twenty-four per cent. of nickel is closely approximates that of brass, when it attains its maximum. The coefficient of expansion then diminishes with further increase of nickel, and it is practically *nil* when the amount of nickel reaches about thirty-seven per cent.

This practically non-expansible alloy, obtained by mixing nickel and iron in the above-named proportions, is commercially known as "Invar." For purposes of comparison we can say that the metal when heated expands about one-tenth as much as platinum, one-fifteenth as much as steel and one-twentieth as much as brass. "Invar" metal has a good bright color, is easily polished and keeps its polish even in damp places; in fact, it is almost non-oxidizable. It has tenacity and offers good resistance to repeated blows. It also possesses great malleability combined with high resistance to breakage. The metal may be produced in crucibles or Martin furnaces by any of the ordinary processes employed in the steel manufacture. The alloys may contain besides iron and nickel small varying quantities of the metals and metalloids which ordinarily enter into the composition of steel, such as carbon, silicon, manganese, etc.

This improved non-expansible alloy is particularly adapted for the construction of standard and geodetic rules, level rulers, and all astronomical instruments; in fact, all instruments or tools for which it is desirable to avoid change of form or size due to changes of temperature. It will also be of great service in the construction of compensating pendulums and balances where it is desirable to maintain the constant length of the pendulum. The alloy may also be used to advantage in the making of hairsprings.

The discoverers of invar naturally found that an alloy having any desired coefficient of expansion between the maximum and minimum may be obtained by introducing the corresponding quantity of nickel, either more or less than thirty-seven per cent. (which gives the minimum of expansibility). Thus, to obtain an alloy having the same coefficient of expansion as glass (which is slightly less than that of platinum), the proportion of nickel may be either twenty-nine or forty-four per cent. When mixed in this proportion, the alloy is known as *Platinite*.

It is generally known that platinum is used in the manufacture of incandescent lamps because it is the only metal which has approximately the same co-efficient of expansion as glass. It is interesting to note that this new alloy "Platinite" is now being quite extensively used in many of the European lamp works. The saving in the cost of the lamps is considerable as the value of platinum is very much greater than that of "Platinite." Experiments are now being made in this country with Platinite, and if found satisfactory, the introduction of Platinite will cause quite a change in the lamp industry.

The Société Anonyme de Commentry-Fourchambault & Decazeville of Paris control the patents and are the only manufacturers of Invar and Platinite. The American agency has been placed with Messrs. Sussfeld, Lorsch & Co., of New York City.

ELECTROLYTIC PROCESS FOR THE MANUFACTURE OF SPONGE TIN.

Sponge tin for the production of metallic or silvered paper, according to a paper read by Gelsthorp before the Faraday Society of London, is made by dissolving tin anodes in an electrolyte of dilute hydrochloric acid and depositing the tin on kathodes of the same metal in the form of a spongy deposit, which floats on the surface of the solution. The vats are 3′ 6″ × 3′ 6″ × 3′ deep and are made of slate. Each contains four anodes and five kathodes connected in parallel and receiving current from a generating plant giving 1,500 amperes at 8 or 10 volts. The five vats in use are connected in series. The anodes as well as the kathodes are 3′ × 2′ 6″ and the current density is 25 amperes per square foot of kathode surface. The solution is kept in circulation by means of a small turbine or plunger pump of lead or block tin, it being drawn from the bottom of the vat and recharged into the top, which is necessary, as otherwise the solution would become too rich at the bottom of the vat and would deposit tin in crystals on the lower part of the kathodes. When the deposited tin sponge has grown to about one inch in thickness it is detached from the kathodes by means of a T-shaped scraper, which is pushed down the face of the kathode plates. The floating, spongy tin is then scooped from the surface of the solution, so as to prevent short-circuiting the electrodes.

The Vulcan Detinning Company, of New York City, have an electro-chemical process for the treatment of tinplate scrap, separating the tin from the underlying steel and recovering the tin in the shape of tin oxide, which is subsequently smelted into pig tin, while the steel in the shape of scrap is thoroughly cleaned, packed by hydraulic presses into hard fagots which are used by the open hearth furnaces for converting into various steel products.

In disposing of gun metal turnings the best method is stated to consist in melting them down in a large furnace which will melt about 500 or 1,000 pounds. The melted metal should be cast in small ingots. An analysis should then be made to determine the percentage of the various metals present. The ingots should then be melted with an equal amount of new metal, with additions of copper or tin, as the case may be, so as to produce the desired gun metal mixture.

A new incandescent electric lamp, constructed by Siemens & Halske, of Berlin, Germany, contains a filament made of the rare metal tantalum.

THE LYNES PROCESS OF BRASS CASTING IN BIRMINGHAM (ENGLAND).

By our British Correspondent.

Labor saving devices and improved mechanisms are constantly being introduced into the Brimingham brass trade, but the improvement that has attracted the most attention of late is humanitarian, rather than mechanical or competitive. It consists of a scheme devised by Mr. Lynes of the firm of Messrs. Rainsford & Lynes for purifying the atmosphere during the process of casting. The process was described and illustrated at some length in THE METAL INDUSTRY, Vol. I, page 85. It has been the subject of investigation by Cabinet Ministers, University Professors, Home Office Inspectors and Medical Officers of Health, while the local trade union, a powerful body, is strongly exerting itself at the present time to secure the universal adoption of the system in the hundreds of Birmingham shops.

Brass casting, as carried on under old-fashioned methods is very unhealthy, and the scientific explanation of this fact lies in the difference of temperature

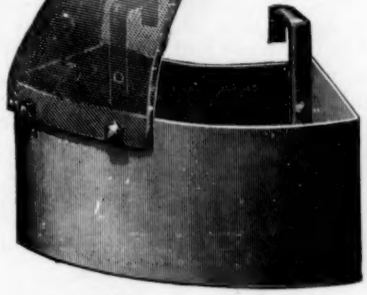
HOLDING HOOD ON THE POT.

In most cases the present tongs may be used by putting a peg in each inner side of bow of tongs, which clamps the rim of hood on to the pot.

at which copper and zinc will melt. The first named metal becomes liquid at a temperature of 2192° Fahrenheit, and the latter at 800°. The much greater heat required to melt the copper continues to exercise a very destructive effect upon the molten zinc, a large proportion of which is in fact driven off in vapor. To make up for this loss, casters allow six pounds of zinc per hundredweight, practically the whole of which is vaporized. The escape is only partial until the molten mixture is disturbed, as in skimming or pouring, when it rushes out in such dense volumes that the prudent caster keeps his mouth and nostrils muffled.

The method of casting has made very little progress since the earliest days of the industry, and the workman standing immediately over his pot, which he lifts with a pair of tongs, when he either skims or pours, receives the full discharge of the vapor. To an extent the men become used to it, but occasionally, especially after an absence of a day or two, the effect is bad on their health.

The contrivance by which Mr. Lynes deals with the fumes is very simple. The caster puts a lid or hood over his pot as he takes it out of his furnace; then he places his pot on an iron stand, and over his hood he places an exhaust pipe, which sucks away the whole of the zinc oxide before it has any opportunity of escaping into the shop. The apparatus can be adapted to a crucible of either one hundred pounds or two hundred pounds weight, and one of the merits claimed for it is the small outlay involved, the cost being for the smaller crucible $50, and for the larger one $75. The apparatus enables the casting pot to be readily carried from one part of the shop to another as the different molds are filled with the metal. It is possible that the oxide deposit in the chimney may eventually be put to some use. The thick accumulation of white powder in the tube has been found to contain no less a proportion than 90 per cent. of pure zinc oxide. Professor Turner at Birmingham University tested it for arsenic but failed to find any. It is probable that this powder



SKIMMING TROUGH.

Hangs on pot in front of pouring hole in the hood. The shield deflects the fumes, while skimming, into the current of air passing through the pouring hole. Shield is made of wire gauze or plain iron, as desired.

may be found useful in the mixing of paints, but up to the present no means has been found of rendering it quite pure enough for this purpose. It is a remarkable fact that the tube, although about three inches in diameter, will become completely clogged with deposit in a single week and requires to be swept out.

The accompanying illustration exhibits the skimming and casting process, at the same time showing how readily the metal can be conveyed either with the extractor attachment from one part of the shop to the other.

The arrangement is much appreciated by the more intelligent of the workmen, who have found their health greatly benefited as the result of the innovation. The local Factory Inspector and Professor Turner, the head of the Metallurgical Department of the Birmingham University, have given it their approval. Professor Turner, in a recent lecture on brass, said, "I was very much impressed myself to see brass casting conducted in so clear an atmosphere. Anyone who has been in the casting shop under ordinary conditions, knows how difficult it is to see across the room while the metal is being poured, and will therefore be quite ready to acknowledge the advantages of a process such as this." It has been found from experiment that a workman using the extractor poured a heat in one minute less time than the workman without the appliance.

A large firm states that the extractor kept in opera-

tion one of their shops employing about twenty men which in the past has invariably had to cease operations when the wind has been in a particular direction, while another firm finds that the exclusion of the draught from the metal in the crucible enables it to keep its heat much longer. It is a remarkable fact that up to the present only a comparatively small proportion of the works have adopted it, apparently because the workmen themselves are careless, and many of the manufacturers are still too old-fashioned and short-sighted to see that there is a close association between

SKIMMING. POURING.

healthy working conditions and commercial success. Patents have been taken out, not only in the British Islands, but in Germany and America. The following details make up the complete apparatus: One length of galvanized iron pipe, with damper and connections for cleaning out zinc oxide; one length of flexible tube, about 7 feet long; one 2½-inch ball joint, one hood, two clips for fastening flexible tube to ball joint and hood, one skimming trough, one plain cover and one iron stand.

The crucible with its hood and the skimming trough are illustrated in the different figures.

THE SAND BLAST IN THE PLATING ROOM.

By Charles H. Proctor.

The sand blast plays a very important part in many plating establishments for the finishing operations on goods made from the non-ferrous metals. Without its aid it is safe to say that it would be practically impossible to produce the many and varied finishes now in use, both useful and decorative. In the production of satin effects in jewelry, sterling silver and silver plated goods the sand blast does away to a large extent with the use of satin finishing brushes. The latter are somewhat costly and do not last very long when they are in constant use.

There are a number of machines in the market for the purpose of carrying out the operation of sand blasting. While it is impossible to say which is the best, they all aim to give the same results. The materials used for sand blasting are sea sand, emery, carborundum and pulverized glass. What particular material is preferable for use depends to a large extent on the class of work and the fineness of the finish desired. The sand blast is probably the most extensively used on the non-ferrous metals in the production of builders' hardware. This is owing to the variety of finishes which are produced on this class of work at the present time, the majority of which are in the sand blast effects and are known as sand copper, sand antique brass, Dutch silver, oxidized silver, French gray, verde antique, Barbédienne and Venetian Iron. All of them are produced with the sand blast where the corrosive effects are desired.

Very little polishing is employed in the production of this class of work and usually it is sufficient to only roughen it out, as it is not necessary to have a highly polished surface. On some finishes the work is blasted first, while in others the plating and relieving of the high parts are done previous to the blasting. All methods, however, have the same end in view, namely the production of a lustreless finish. Many effects in the patinas and verde greens may be produced in the same manner without the aid of corrosive acid solutions which take a good deal of time and are not always satisfactory. The method consists in coppering articles sufficiently so as to produce the usual oxidized black with the aid of potassium sulphide. The work is then lacquered with a varnish lacquer. Any desired color is made up from chrome greens, zinc white, lamp black, soluble blue and chrome yellow. So much of any of these combinations is used to produce the shade desired. They are then mixed up to the consistency of thin paint with turpentine and a small amount of turpentine copal varnish. This is applied with a fitch varnish brush after lacquering and dried. This coating will dry in a lacquer oven in five minutes. The high parts may be relieved with a small amount of turpentine on a rag. The articles are then sand blasted. This method produces a high finish for cabinet hardware, builders' hardware and verde antique effects on lamp work or other classes of goods. The finish wears well and looks very antique.

The sand blast is also used in the production of blasted nickel-plated sheets of copper, and in the production of ground glass effects on celluloid goods. It is also used in the production of articles made from aluminum and to some extent in the cleaning of iron work before plating. Many effects might be produced on polished surfaces by having stencils made of soft rubber, with any desired design cut in them. The sand blast does not affect pliable surfaces, and it seems to the writer that many beautiful effects could be produced on polished surfaces in this manner, as the dull effect produced would contrast nicely. The method is used etxensively in producing imitation etched glass effects and there is no reason why it should not be turned to advantage in decorating polished surfaces, more especially those of brass or bronze.

OXIDIZING BRASS BY IMMERSION IN THE AMMONIA COPPER SOLUTION.

By Charles H. Proctor.

The best ammonia solution for oxidizing brass which can probably be used is made as follows: One-half pound of carbonate of copper is dissolved in one gallon of 26 per cent. ammonia water. After thoroughly stirring, ½ gallon of warm water is added and 8 ounces of sodium carbonate. When the articles are immersed in this solution an intense black color is obtained with the lustre according to the finish applied before immersing. After coloring, the articles are passed through cold water and a soap solution consisting of one ounce of platers compound to each gallon of water. This solution helps the articles to dry rapidly, and the drying is afterwards finished in maple sawdust. Carbonate of copper is prepared as follows: Equal parts of sulphate of copper are dissolved separately in as little boiling water as possible in order to accomplish the solution. The soda solution is added to the copper solution as slowly as possible, so as to avoid too much effervesence, owing to the generation of carbonic acid gas. After effervesence ceases the precipitate is allowed to settle and the solution is drawn off. The precipitate is then washed several times. Two pounds of sulphate of copper and two pounds of sodium carbonate will produce one pound of carbonate of copper when dry.

WHITE BRASS AS AN ANTI-FRICTION METAL.

By Jesse Jones.

White brass possesses many points of excellence as an anti-friction metal, being superior to the tin or genuine babbitts in its ability to withstand wear, and also much cheaper, and being free from the brittleness that characterizes the cheap lead babbitts and their tendency to creep or spread under the influence of pressure or of percussive strains. These qualities make it a very satisfactory metal for heavy pressure or fast running journals. It, however, requires more careful and intelligent treatment than the average babbitt, its high melting point and consequent sluggishness making it difficult to pour into thin sections. Cold-shuts are likely to occur. Often these are invisible, especially after machining, and exist simply as lines of weakness which when the bearing is put into service are likely to give way, causing flaking and pushing out of the metal.

Flaking may be due to other causes, such as insufficient oiling or too much play in the bearings, especially in crank-shaft bearings or short-stroke engines where there is a tendency to pounding. If a drop of oil on a smooth steel plate is hit a sharp blow with a hammer, it will explode. There is a similar action in a crank-shaft. It strikes a blow on the bearing, drives the oil away, and the minute explosions leave bare spots that start to drag and flake, and if dragging or flaking begins at any point, it soon spreads.

A plan that may be used for detecting the beginning of dragging in important bearings is to take a battery jar or other source of current and, having connected one terminal to the shaft, touch the other terminal to the bearing from time to time. If the oil film is continuous no spark will be observed, but if dragging has commenced a spark is seen immediately. The receiver of a telephone may be used in a similar manner, the grinding noise that is heard, when cutting is in progress, being unmistakable.

The mixture for White Brass that has been used by a number of firms with good results, consists of 64 parts of tin, 34 parts of zinc and 2 parts of copper. If a metal of greater compressive strength is required, the copper may be increased to 4 parts or even to 8 parts, but the relative proportions of the tin and zinc should be changed as little as possible. As the amount of copper is increased, the coefficient of friction and the rate of wear in service also increases rapidly. A similar effect is produced by the small amounts of aluminum, phosphorus, etc., that are added by certain manufacturers as deoxidizers. These elements are detrimental to White Brass or to any other babbitt to which they are added. They may add slightly to the fluidity of the metal, but this can be attained in other ways less perjudicial. A certain manufacturer of White Brass would seem to intimate from the name of his product that it contains a percentage of nickel. None was found in it, but if it had been present it would have only caused hard spots.

Fluidity may be obtained in White Brass by using pure materials and mixing entirely in crucibles instead of iron kettles. Zinc, as is well known, soon takes up iron if melted in iron vessels, or if stirred with iron bars, and in consequence its melting point is raised and it becomes very sluggish. For this reason plumbago crucibles should be used for mixing and plumbago rods for stirring. The spelter or zinc is often contaminated with more or less oxide, and quite a difference can be noticed in the fluidity of the White Brass, due to more or less oxide in the spelter. As the common grades of spelter contain from 1% to 1½% of lead, this will diminish the strength and toughness of the metal. Scrap metal or remelt can be cleaned by boiling up with potatoes or the use of scrap leather. A scoop of resin thrown on the surface of a pot of metal and then set on fire is also good. A flux consisting of cyanide of potash and sal ammoniac and another composed of white arsenic 1 oz. and silica sand 1 lb., have been found useful.

The metal should be cast into small ingots and poured slowly to avoid foaming. The blue color on the surface of the ingots may be obviated by throwing a little sal ammoniac on them immediately after pouring. Where very small bearings in White Brass are required, good results may be obtained by casting the metal in long rods of the required diameter, which can be put on automatic machines that will turn out the finished bushings very rapidly and at a small cost. Brooching solid bearings is also a decided advantage. In making sand castings, the sand should be as dry as possible and large gates and risers should be provided. The metal is poured quickly, raising one end of the flask by means of bricks and wedges. It is poured at a blue heat.

In bearings for electrical machinery, many engineers think it is of importance to have a bearing metal of good electrical conductivity on the ground that eddy currents and static discharges may fuse the babbitt metal fast to the journal. White Brass has an electrical conductivity of 16.71 compared to copper as 100, while the conductivity of Government standard A-1 babbitt is 8.5 and that of one of the best known lead babbitts, only 4.5. Whether the electrical conductivity of a babbitt is a matter of importance or not, the heat conductivity (which closely follows the electrical conductivity) is of considerable importance for cool running. It is obvious that a babbitt which does not heat up much and which conducts away rapidly any heat generated is very desirable. The value of this property of the White Brass is accentuated where a bronze or water-cooled shell is used.

The physical properties of white brass are:

Tensile strength	12,500
Elastic limit	8,000
Elongation in 2"	20.5
Reduction of area	17.5
Specific gravity	7.32
Shrinkage in 12" x 1" x 1"	.04"
Melting point (2% copper)	680° F.
Melting point (4% copper)	940° F.

A cylinder 2" high by .798" in diameter only showed a permanent set of .0005" at 4,000 pounds and at 20,000 pounds had been compressed down to half an inch but was still intact. On a friction testing machine the following results were obtained:

Total number of revolutions	1,000,000
Revolutions per minute	446
Pressure per square inch in pounds.	250
Coefficient of friction	.0077
Bearing lost in Troy grains. .215 or	.008%
Rise in temperature, °F.	30.5
Relative rank (A-1 babbitt as 100)	290.8

A representative lead babbitt tested in a similar

manner had a relative rank of 72 as compared with A-1 babbitt.

The very low rate of wear shown in the above test has been corroborated again and again in actual service. In one case that is recalled by the writer, brass gauges had been fitted from the top of the main shaft journals to a planed surface on the engine pedestal block. After ten years continuous service the gauges showed that the shaft had only gone down one-thirty-second (1-32) of an inch and the bearings had not been rebabbitted or lined up since being built.

ORNAMENTAL VASE.

The vase shown in the accompanying illustration is of the Italian renaissance style. It measures 20 in. high

ORNAMENTAL VASE, DESIGNED BY A. E. GEILS.

over all and the spread of the base is 7½ in. The top, dip and the lower base are to be made of bronze or white metal (spelter). When the various parts are cast in spelter, metal slush molds must be made of them. After the various parts are cast, they are soldered together and dressed. They can then be electroplated to any desired color. The center piece is to be of decorated china, and its greatest diameter is 6 inches.

REPLENISHING THE NICKEL BATH.

By Charles H. Proctor.

The usual method of replenishing the nickel bath consists in dissolving as much nickel salts, i. e. double sulphate of nickel and ammonia, as is necessary to bring the solution up to the required strength. Some platers add ammonium sulphate or chloride, while others introduce common salt in order to increase the conductivity of the solution. While these methods give satisfactory results in many instances it happens frequently that the deposited nickel is not of a clean white color. This is the case especially when the articles to be nickel-plated remain in the bath for any length of time, when they are apt to take on a darker tone, which in some cases approaches the color of black nickel, especially in the interior of such articles as have any depth. The double salt mentioned above is not very soluble, unless the water is boiling hot, and even then not more than 1½ to 2 pounds can be dissolved in a gallon of water. Therefore in the summer time the dissolving of large amounts of this salt has a tendency to raise the temperature of the bath far above the normal one at which good results are obtained.

The following method of replenishing the nickel bath has been used by myself for a number of years. I have found it very satisfactory, as it produces a beautiful white deposit, which is hard and clean and produced without any danger of blistering if the work is clean. The procedure I have adopted is as follows: For a nickel bath averaging 200 gallons, ten pounds of single sulphate of nickel are dissolved in 2 gallons of boiling water and are added to the bath. This will give the equivalent in metal of about the same amount contained in 30 pounds of the double salt and dissolves very freely. The bath should be stirred thoroughly and its conductivity should then be increased as follows: Ten ounces of commercial sulphuric acid are dissolved in ½ gallon of cold water and thoroughly stirred into the bath. Thirty ounces of 26 per cent. ammonia water are then added, in order to neutralize the free acid and form a concentrated conducting ammonia salt. When proceeding in the manner outlined above, it is best to replenish the nickel bath shortly before quitting time or after the day's work is done. This gives the bath a chance to regain its normal condition by the morning, and thereby prevents delay in the work.

The advantage of this method of replenishing consists in fact that the bath is always uniform and is rapidly replenished at any time, as it clears itself very quickly. Furthermore, when commercial ammonium salts are used, various impurities are carried into the bath, especially when cheap ammonium sulphate is used. These impurities have a tendency to produce darkish deposits. When sulphuric acid is neutralized with ammonia, very little impurity is introduced in the bath.

The above method costs no more than others, and is more rapid in results. Where single sulphate of nickel is used, one can be always sure of its metallic contents, which is more than can be said of many of the double salts sold in the market. In plating by the machine or tumbling barrel method it will be found of advantage to add one or two ounces of sodium bisulphite to each five gallons of solution used. This addition causes a very rapid deposit and is useful on small work.

GOLD PLATED STERLING SILVER ARTICLES.

By Charles H. Proctor.

A recent innovation in the manufacture of jewelry consists in the production of sterling articles which are afterwards gold plated in the various bright and antique finishes now in vogue. While this is a new method of proceedure in the United States, it is quite old in England, the method having been used there for a very long time. This class of work has been produced under the name of silver gilt work. Articles made up in this manner cost the consumer probably half as much more than goods made from a copper alloy and gold plated. The advantages gained, however, more than balance the extra cost and the usefulness of these articles for usual wear is fully equal to those made of gold. Silver is a non-corrosive metal, and is used extensively in surgery. On this account it is a metal as satisfactory as gold for coming in contact with the skin and, when finished in the bright and antique gold effects, the articles have every appearance of being made of the latter metal itself.

It is well known that articles made with a base metal of the copper alloys, especially such as cuff buttons, collar and shirt studs, when the gold is worn off, form a greenish stain on the skin. This is especially noticeable in the summer time, when the acids contained in the perspiration attacks the metal and produce copper salts, which are liable to cause irritation of the skin. With the use of silver this could not possibly occur. Another reason why these goods are superior to the regular goods produced, even at the advance in cost, is, that when the gold commences to wear off, a good clean metal is underneath, which makes a good contrast with the remaining gold in the back ground. The articles are also easily kept clean with a little soap and water, and ammonia cleanses them, while a little powdered whiting and a soft rag will polish them. It is also possible to get them gilded at any of the jobbing plating shops for a small amount. This makes them practically new again, and in this way they will last for years and be always of some value. It seems to the writer that there is an extensive field for this class of goods and it seems a wonder that our progressive manufacturers have not thought of this idea before this time.

GOLD AND SILVER JEWELRY IN FRANCE.

Three standard qualities are established for gold viz, 920, 840 and 750, the last being equivalent to 18 carat. For silver manufacturers two standards exist, viz, 950 and 800. The law prohibits the sale manufacture, or importation for use in France of any articles in gold or silver of lower quality than 750 for gold and 800 for silver. The great bulk of jewelry sold in France is of 750 (18 carat), though the finer qualities are frequently employed, as in the case of fine medal work, and especially when beautiful effects in enamel are desired. In silverware nearly all of the silversmiths employ 950 fine, the 800 being principally employed in making goods for the cheaper trade and for exportation.

According to law every article of gold or silver must bear the stamp of the maker (a special registered mark), also that of the "bureau de contrôle," and for this latter a tax is paid to the Government. Imported articles have a special "contrôle" stamp, and also pay a tax. In each case the tax is computed according to the weight. In establishing the quality allowance is made in case of soldered articles, etc., of 0.003 for gold and 0.005 for silver. Goods imported into France of a lower quality than the minimum standard are not subject to confiscation unless there is evidence of an attempt to defraud; the importer is, however, liable to have them broken and delivered to him in a damaged condition.—Consular Reports, U. S.

THE ALUMINUM INDUSTRY.

The ten plants enumerated in the following table produce aluminum by the electric current, the Pittsburg Reduction Company being the only one whose sole product is aluminum, while the others manufacture other products as well:

Name.	Location.	Horsepower available.	In use.
Pittsburg Red. Co.,	Niagara Falls	—	14,000
Pittsburg Red. Co.,	Massena Springs	1,200	—
Pittsburg Red. Co.,	Shawinigan Falls, Quebec	6,000	5,000
British Al. Co.,	Foyers, Scotland	14,000	5,000
Société Electrometallurgique Française,	La Praz, Savoy, France	12,500	5,000
Compagnie des Produits Chimiques d'Alais,	St. Michael, Savoy, France	6,000	2,000
Alum. Industrie,	Neuhausen; Aktien Ges., Switzerland	4,000	4,000
Aktien Ges.,	Rheinfelden, Germany	5,000	5,000
Aktien Ges.,	Lend Gastein, Austria	15,000	15,000

The Pittsburg Reduction Company uses the Hall process, while the others, with the exception of the Compagnie des Produits Chimiques d'Alais, which uses the Hall-Minet process, work under the Héroult patents.

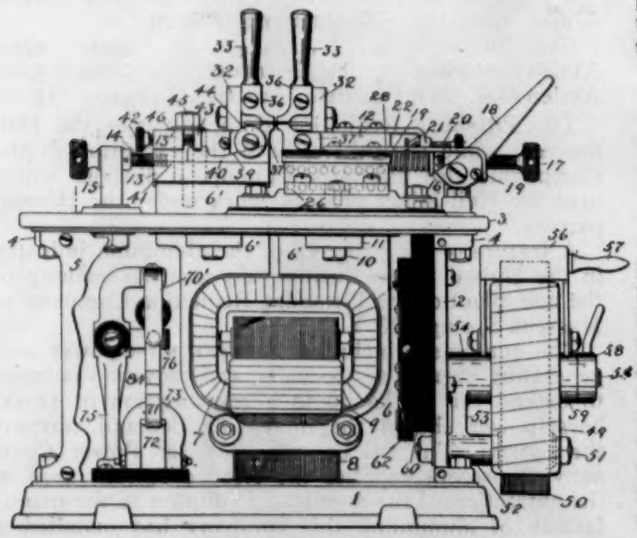
A feature of the progress of the aluminum industry in the United States during 1903 was the opening of the new plant of the Pittsburg Reduction Company at Massena Springs, N. Y.

The equipment includes four 300 horse-power sets generating current at 500 volts, and provision is made to extend the works up to a consumption of 12,000 horse-power should the increasing demand warrant the outlay. The St. Lawrence Water Power Company at present supplies the electric current used in the extraction of the metal. In addition to the manufacture of aluminum, this company has installed a plant for the manufacture of carbon electrodes used in the reduction furnace, and has also a wire mill under construction. The company now has the large capacity of 17,200 horse-power, which is equivalent to 4,850 tons of metal yearly, a quantity that almost equals the combined output of the European producers. It has two plants at Niagara Falls, N. Y., the upper one using 4,000 horse-power, near the grounds of the Niagara Falls Power Company above the falls, and the lower one, on the edge of the gorge, using 6,500 horse-power, supplied by the Hydraulic Power and Manufacturing Company. The Pittsburg Reduction Company was the first manufacturing plant to use the power of the Niagara Falls Power Company in 1893, and, as an inducement, it is understood that a contract was entered into for the supply of electric current at a cost not exceeding $18 per horse-power per year, including the machinery at the aluminum plant. The daily output installation by the power company of transforming of the lower plant, which is operated exactly in the same manner as the upper one, is about 11,000 pounds of metallic aluminum, which gives a total daily output from both plants of the company approximating 19,000 pounds.—U. S. Geological Survey.

ELECTRIC WELDING MACHINE.

Electric welding operations are being carried out successifully in always increasing number for various purposes in the metal working industry. Welding and brazing of tubing of various metals, welding of brass nuts to steel bolts, and welding of german silver, brass and copper wire, are among the operations carried on by the help of the electric welding machine The following is a description of a recent type of a machine for carrying out electric welding which was patented by A. F. Rietzel,, of Lynn, Mass., with United States patent 785,379 of March the 21st, 1905, assigned to the Thompson Electric Welding Company of the same place.

As shown in the cut, the machine is provided with a base 1 which carries the end frames 2 and is surmounted by the table 3, above which are located the work-holding slides and adjusting parts. The front plate 5, which is shown partly removed in the figure, closes in the apparatus beneath the table. A transformer 6 is located below the table, the secondary coil of which is connected to the work-holders. Upon the terminal 6 there are mounted the work-holding slides or carriers 12, 13, which are provided with work-holding jaws or clamps.

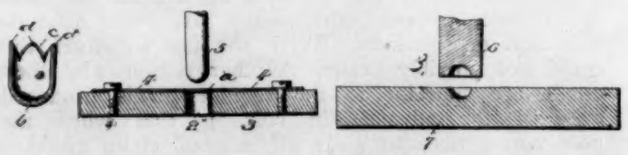


ELECTRIC WELDING MACHINE.

When the parts are in the position shown in the drawings, which is their normal position the contacts of an automatic cut-off will be engaged, but the contacts of the starting switch will be open and no current will flow, therefore, in the primary of the transformer and no current can flow through the work. After the work-holding slides are moved apart by means of the lever 18, and the work has been clamped in, the lever is moved back and pressure put on the work by the spring 15. The current controller having been set for the desired amount of current, a manual starting device is pushed inward and a spring engages a contact, whereupon current flows through the primary coil of the transformer. The articles are immediately heated and are forced together by the spring 15 operating on the work-holding slide. This brings a controlling device into action so as to close the circuit of magnet 73, which thereupon releases the cut-off lever. The latter immediately opens the circuit of the primary and the flow of current through the welded pieces stops. When the opearator releases the starting device or pulls it back, the cut-off device is automatically re-set, but this cannot be affected without an opening or re-setting of the contacts of the starting switch. It is absolutely impossible for the operator to leave the starting device "on" and, after putting the work in the clamps, to close the automatic cut-off.

MANUFACTURE OF HOLLOW METAL BALLS.

The following method for the manufacture of hollow metal balls is outlined by A. Johnston, of Ottumwa, Ia., in a recent U. S. patent (No. 781,951, Feb. 7, 1905). A sheet metal blank a is placed upon the hole 2 in the die 3, the gauge plate 4 into which the blank fits serving to accurately center the latter. The punch 5 then operates on the blank and produces a cup b as shown in the cut, with irregular or pointed edges around its upper end. The edges are inclined inwardly, and the preferred way of producing the inward inclination is to employ a punch, the diameter of which is greater than the diameter of the die opening minus twice the thickness of the blank. For instance, in making balls one-quarter inch in diameter from stock 0.025 inch thick, the desired results have been obtained by making the diameter of the die opening 0.238 inch and that of the punch 0.198 inch, the difference between these diameters being 0.040 inch, or 0.010 inch less than twice the thickness of the blank.



The punch and the die co-operate in drawing out and reducing the thickness of the annular wall which lies between the punch and the wall of the opening. The drawing of the metal takes place largely at the outer surface of the cup, which is therefore caused to extend upwardly beyond its inner surface and gives a lateral inward inclination to the edge c. The bottom of the cup will be slightly thinner than the original blank but thicker than the side wall, depending upon the amount of drawing which takes place. In the example described the cup thus formed, which has a diameter of 0.238 inch, is closed by dies 6 and 7, the die openings corresponding to that desired for the balls, namely 0.25 inch. These dies in acting upon the cup will expand it from the diameter of 0.238 to 0.25 inch and force the points d of the blank tightly together, forming seams. The formation of seams which are tightly closed at the outer surface of the blank is assured by the lateral inward inclination of the edges c.

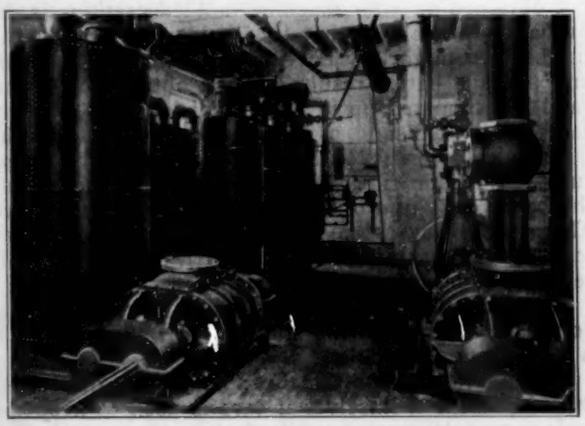
An aluminum and calcium alloy is now being used in France for the removal of gases from steel. While aluminum alone attacks the carbon monoxide gas which is in the steel, it fails to remove the hydrogen and nitrogen, and so blowholes remain in the steel after the aluminum has been introduced. The addition of the calcium, it is said,, has the advantage of directly combining with these gases.

Cadimum is a metal harder than tin, melting at about 320° centigrade and boiling at about 860° centigrade. It emits a crackling sound when bent and has a fibrous structure.

PETROLEUM GAS FUEL FOR MELTING METAL.

A gas of high calorific efficiency is stated to be produced from crude distillate of petroleum in the Acme gas plant, shown in cut. The gas is said to be suitable for all kinds of furnace work, where not only city gas or gasoline has formerly been used, but also in such furnace work as that in which hard coal, coke and fuel oil have been employed. The gas is claimed to be made at a cost of from 10 to 12 cents per thousand cubic feet. Plants are stated to have been installed in many manufacturing establishments, where the gas has displaced other fuels for melting metals, in all classes of heating furnaces, such as forging, annealing and tempering, and also for the finer classes of work, such as plating and hard and soft soldering, and in blow pipes and bench burners.

The gas is used in the same manner as is natural gas or the ordinary coal gas supplied from the city mains. The process of manufacture is simple. The illustration shows a complete generating plant with the exception of the high pressure rotary blower and oil storage tank. Gas is made by forcing air under pressure into the generators containing crude distillate of petroleum, which generators are so arranged inside, that the surfaces of the air and oil are brought into thorough contact and the particles of air and oil are made to admix. It is claimed that the gas made is a fixed gas, and can be piped any distance.



HARVEY GAS PLANT.

These plants are in use in the factories of a good many watch and watch case manufacturers, where the gas is used in all of the furnace work, and on account of the low cost, effects a saving amounting to at least 75% or 80% over coal gas secured from city mains.

The gas is also used in machine shops for melting Babbitt metal, under galvanizing kettles, in heating furnaces, and open blacksmith forges. The saving effected over the use of coke and coal and fuel oil for this latter class of work is said to be considerable, it being brought about not only by the lessened cost of fuel but by the fact that in furnaces and forges the output is largely increased over other fuels. This increase is made possible by the fact that the fire is continuous and uniform throughout the entire day, and that the delay of rebuilding and cleaning out coal and coke fires is entirely eliminated; while the fact, that the gas is admitted into the furnace under a pressure of 3 to 4 pounds, will bring metals to a forging, welding or melting heat in a much shorter time than has heretofore been accomplished.

These plants have been on the market for about four years, and are manufactured and installed by The Acme Gas Company of Chicago, Illinois.

GRAPHITE FOR BRASS FURNACE LININGS.

According to *Graphite*, one of the largest brass casting foundries in the United States has used Dixon's crucible mixture in place of fire brick for brass furnace linings.

A wooden cylinder is made and placed in the furnace, the space between the cylinder and the furnace wall being the same as that usually occupied by the fire brick. The mixture is made into a mortar by mixing with water, to which a small quantity of silicate of soda has been added—about half a pound of silicate of soda to a gallon of water—and is poured into the space mentioned above. The silicate of soda causes the mortar to set quickly, and the wooden cylinder can soon be withdrawn and put aside for future use. By means of the cylinder any portion of the furnace lining can be repaired or rebuilt.

It is claimed that the refractory nature of Dixon's crucible clay and graphite will insure a more durable lining than if made of fire brick, and one more easily and economically repaired. In making repairs the wooden cylinder is not always required. The lower portion of the furnace, which is subjected to the greatest heat and therefore most liable to give way, can be easily repaired by breaking away the worn parts and filling the cracks and holes with the mortar made of the crucible mixture.

In some foundries the brass furnace is of the same diameter as a straight-sided charcoal barrel, and such a barrel may be used in place of the wooden cylinder, and the barrel left in and the fire started at the proper time.

TAP EXTRACTOR.

One of the troublesome mishaps in any metal working shop is the breaking of a tap. In former days such a break would cause the loss of a great deal of time, labor and profanity. Nowadays the mechanic has provided a tool which will save this loss. The accompanying cut shows a tap extractor which has been on the market long enough to prove its usefulness and which is manufactured by the Atlas Machine Company, of Providence, R. I. To use the tool the end is

pushed into the tap hole, the blades are slid forward into the grooves of the tap by means of the outer collar, the sleeve is then slid down close to the work and the tap screwed out by means of a wrench set on the square end of the tool. It is made for 3 and 4 fluted taps in 23 sizes. The extractors are very useful tools in all kinds of metal working shops.

Joseph Wharton, the so-called "Nickel King," has endowed the Wharton School of Finance of the University of Pennsylvania with a sum of $500,000. Mr. Wharton is identified with many other enterprises besides the nickel industry.

CORRESPONDENCE DEPARTMENT

In this Department we will answer any question relating to the non-ferrous metals and alloys. Address THE METAL INDUSTRY, 61 Beekman St., New York

Q. A plater wants to have information regarding the stripping of silver plate from steel knives.

A. The cyanide strip in connection with the electric current is usually employed for this operation. The solution is composed of 1 lb. of chemically pure cyanide of potash to the gallon of water, 1 lb. of caustic soda being added to each 4 or 5 gallons of solution so as to facilitate the work. The work is fastened upon an iron wire and attached to the anode rod, and a series of articles may be stripped at the same time. A steel kathode should be used with a fairly strong current, and the work should be agitated. The anode should not be covered too much with silver, as the articles will then not be attacked as quickly as if it were otherwise. Cyanide should be added to the bath from time to time so as to keep it in working condition.

Q. A plater asks for information as to his silver plating solution with which he has trouble. It contains 10 oz. of silver, 1¾ oz. combined cyanide and 2¾ oz. free cyanide to the gallon, according to chemical analysis.

A. The solution is evidently too much concentrated. It seems hardly advisable to use a solution with such a high amount of silver kept in solution by potasium cyanide, as the results obtained are no better than those from standard solutions which contain much less. The practice of carrying such a high solution is therefore needlessly extravagant and costly. The standard solution usually contains from 3 to 4 oz. of silver to the gallon taken up in about 8 and 10 oz. of potassium cyanide. Your solution will probably work better if you would dilute it to the normal strength.

Q. A subscriber asks for information concerning the polishing of aluminum in a tumbling barrel using leather scrap. The shape of his castings makes it difficult for him to polish and buff them.

A. There does not seem to be any reason why aluminum castings should not be polished in a tumbling barrel with scrap leather, as aluminum can be polished just as well as other metals. Of course it will require repeated trials in order to get the most satisfactory results, as aluminum is more easily scratched than other metals. The leather scraps should not be greasy, because, when they are, they do not polish as well. The proper amount of leather scrap to put in the barrel is also a matter of considerable importance if it is desired to perform the operation to the best advantage.

Q. A manufacturing establishment desires information as to what alloy can be recommended for sterling silver. They buy .999 fine and use the copper alloy to reduce it to .930 fine.

A. Sterling silver is .925 fine, and if the metal of .999 fine is reduced to .930 fine, the silver is 5 per M finer than sterling silver. If it is desired to have the metal even whiter and more ductile than sterling silver, the following composition might be tried, namely 900 silver, 18 copper, 82 cadmium. The last metal is, however, expensive. A cheaper composition which has a beautiful white color is obtained by using 90 silver, 5 copper and 5 zinc.

Q. A subscriber wants to obtain information as to the bluish color on sterling silver known as fire coat and how it may be removed.

A. A bluish color on the surface of sterling silver is due to the presence of oxide of copper. In order to give to the silver articles, which show a gray or bluish color, the pure white color of silver, the best procedure is to dip them into strong hot lye solution, rinse well in plenty of water without touching them with the hands and then placing them for about two minutes into boiling dilute sulphuric acid. When they come out of the acid, they must be well rinsed and dried. Another method for removing the fire coat depends upon the use of permanganate of potash, some details about which will be found in THE METAL INDUSTRY, Volume 3, January, 1905, page 11.

Q. A subscriber informs us that he is making green casting work on his molding machine which was recently installed in his brass foundry, and that he encounters quite some difficulty in getting out a proper bold surface on the castings. He would also like to know what sand would be best to use in order to overcome this defect.

A. The reason why a sufficiently bold surface is not obtained on your machine molded castings is due probably to the fact that the molds are rammed too hard. You might try not to ram them quite so hard and perhaps better results will be obtained. Albany sand No. 0, mixed up in the proportion of 1-3 of new sand and 2-3 old sand, makes a good mixture for molding machine work. No. 00 is finer and gives better results. Windsor Locks and French sand is used on the better class of work, but these are more expensive. There are always some little difficulties in manipulating molding machines after the start, but they usually regulate themselves with experience.

Q. A manufacturer would like to receive information in regard to drawing soft steel flat stock, or what is termed gun metal.

A. In drawing soft steel no unusual difficulties should present themselves if care is used to keep the surface well lubricated while drawing. A good mixture to be used in this connection consists of fish oil soap and lard oil boiled together with water or a good lard oil may be used. It is customary to use for this operation the same tools that are used in drawing brass. If there is any depth to the shell, the articles are usually cupped first and then finished in the second operation by drawing or in the power press. If it is necessary to anneal the work for further operations, a 15 per cent. solution of hydrochloric acid will be found useful to remove the scale formed. This solution should be used warm. A weak solution of sodium carbonate will be found useful to place the work in, in order to prevent its rusting after pickling.

Q. A subscriber asks for formula for nice yellow dip gold solution on cheap novelties.

A. A formula for dip gilding may be made up in the following manner: 1 oz. of fine gold, reduced to chloride, 80 oz. caustic potash, 20 oz. bicarbonate of potash and 8 oz. of chemically pure cyanide of potassium with 5 gallons of water. Instead of the fine gold 2 oz. of commercial chloride of gold may be used. The solution is made up as follows: the cyanide is dissolved in one gallon of water and the chloride of gold

is then added. The bicarbonate of potash and the caustic potash are then dissolved in the remaining 4 gallons of water and after the solution has become clear it is mixed with the cyanide and gold solution. This solution should be used at nearly a boiling temperature. To replenish the solution chloride of gold is added when necessary and also a small amount of cyanide and potash every few weeks.

Q. A plater asks for information concerning the best method of producing the old copper finish.

A. A solution for the production of old copper (oxidized copper) is made up as follows: 2 oz. of sulphide of potassium, 1 oz. 20 per cent. ammonia water to each gallon of water used. The temperature should be about 120 degrees, and the solution should be made up some hours before using it. If brown colors are desired, the ammonia should be omitted. If the goods are made up of other metal than copper, they should be plated in a cyanide of copper bath and afterwards in the acid bath if a heavy deposit is required. The oldest effect is given by relieving on a soft brass scratch brush with the aid of pumice stone. The articles may also be relieved with the hand rag and pumice stone or on a felt wheel using rouge, which procedure gives a brighter tone.

Q. A plater is troubled with a stain which appears on brass plated work after it has been standing a day or two. He asks for information as to what will help him to avoid that trouble.

A. The stain on brass plated work which appears after standing may be caused by having too much ammonia in the solution or not sufficient copper or cyanide. The addition of ½ oz. of bisulphite of soda to each gallon of solution may assist in the proper working of the bath. When working correctly, this stain should not appear unless there is too much zinc in the solution.

THE METAL INDUSTRY.

Reports are being received from New England and other parts of the country of how THE METAL INDUSTRY is appreciated and of the valuable information contained in the paper. The subscribers say that its reading matter is new, up-to-date with no rehashing of former articles and that it tells what the readers want to know concisely and correctly, giving the best practice of the leaders in the non-ferrous metal industry. Particularly since January, 1905, have the readers found the articles valuable and in order that all may be thoroughly familiar with them, we herewith mention some of the original matter published since the first of the year: "Recent Tests of Alloys," "Verde Antique Finish on Soft Metals," "The Birmingham Brass Trade," "Casting Bronze by the Cire Perdue Process," "Black Nickel or Gun Metal Finish," "French Sand Molds for Casting Gold, Silver or Base Metals," "Modern Mold Making," "Modeling as Applied to Brass Founding," "Fire Cracks in German Silver," "Ormolu, Bright Gold Finish on the Soft Metals," "Molding Trolley Wheels in a Molding Machine," "The Manufacture and Use of Gold, Silver and Brass Solders," "Drawing Sheet Metal Without Annealing." Besides the instructive long articles there is the valuable short matter, editorials, Correspondence Department and Patents. Altogether such valuable information on the Founding, Finishing, Rolling and Plating of the non-ferrous metals has never been published and more is to follow.

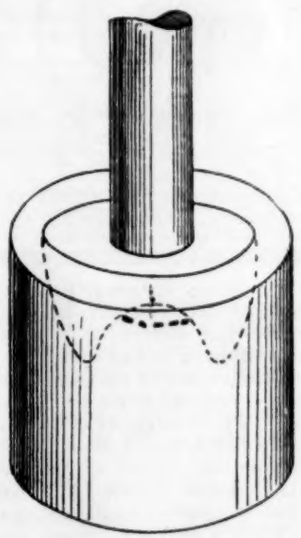
READERS' OPINIONS.

Correspondence is solicited from all of our readers on subjects relating to the founding, finishing, rolling and plating of the non-ferrous metals and alloys. Name and address must be given, though not necessarily for publication. Address THE METAL INDUSTRY, 61 Beekman street, New York.

DRAWING SHEET METALS WITHOUT ANNEALING.

To the Editor of THE METAL INDUSTRY:

I have read with interest the article on "Drawing Sheet Metal Goods Without Annealing," by Mr. Kelley, in the April issue of THE METAL INDUSTRY. I should consider it preferable in the first drawing to shape the die as indicated by the heavy dotted line shown in



cut. The shell would then be placed in the second die the same side up. The cup in the center would engage the force die and reverse the object without the long tearing bend suggested in Mr. Kelley's method.

D.

The method of melting scrap aluminum, described in THE METAL INDUSTRY of April, Volume 3, page 69, referred to the best practice of the larger melters. Some of the smaller melters report that they are able to melt the scrap without trouble by having a slow fire and watching it carefully. One melter stated that he finds when scrap, no matter how fine, contains oil, it melts very readily and is free from oxide or dross.

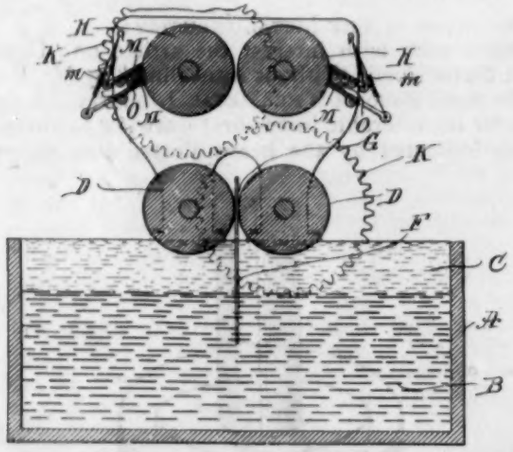
Reports of new discoveries of tin ore in various quarters of the world are made from time to time. One of the new deposits is said to be in South Africa in the center of the Transvaal. In the meantime metal consumers continue to pay good prices for tin.

The outlook for the production of metallic antimony from domestic antimony ores in the United States is stated to be very unpromising, on account of the complexity of the smelting process for the extraction of the metal and the removal of the import tax on crude antimony.

PATENTS

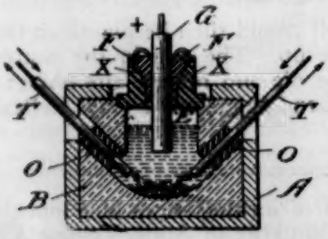
A full copy of any Patent mentioned will be furnished for Ten Cents. Address THE METAL INDUSTRY, 61 Beekman Street, New York

786,336, April 4, 1905.—APPARATUS FOR TIN PLATING.—F. L. Young, Boston. The apparatus is intended to prevent the staining of the plates by the oil. It consists of a tank A which contains the molten tin B and a layer of oil C above it. The rolls D are arranged above the tank for the purpose of finishing off the plate and compressing it and its coating of tin to the desired



thickness. A pair of auxiliary squeeze rolls K are mounted above the rolls D and are provided with scraping devices M between which is placed an absorbent material O. As the plate F passes from the rolls D covered more or less with oil, it enters the rolls H, and the oil upon the surface of the plate F passes to that of the rolls H, whence it is removed by the scraping devices.

786,244, March 28, 1905. PROCESS OF EXTRACTING ALUMINUM OR OTHER METALS.—H. S. Blackmore, Mount Vernon, N. Y. The mixture used in the process consists of one part of aluminum oxide and two parts aluminum fluoride. The charge is placed in the furnace A and fused by passing an alternating current through the electrodes T. When a sufficient amount has been fused, a



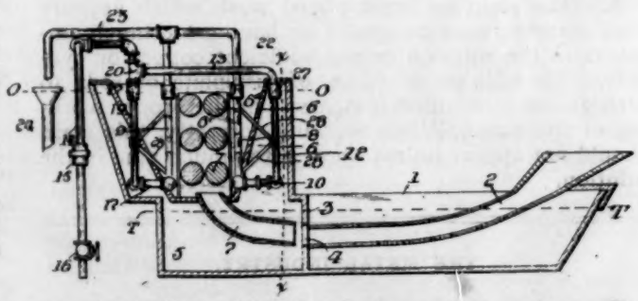
direct current is passed between the anodes G of carbon and the carbon lining B of the furnace, which acts as the kathode. The current has a tension of three volts and a density of 85 amperes per square inch of anode surface exposed. The aluminum metal accumulates in the bottom of the furnace and is withdrawn as desired by taphole K.

785,541, March 21, 1905. PROCESS OF METALLIZING FABRICS.—C. Danilevsky and S. Tourchaninoff, St. Petersburg. The process of metallizing leather and its substitutes, asbestos, linen, etc., consists in first cleansing the fabric by macerating it in a suitable acid or alkaline liquid. A backing is then formed either of a copper wire fabric or metal plate, or by covering the face of the fabric to be coated by plumbago or finely divided metal. For copper the plating is composed of citrate of copper 10 to 20 grams, and borglyceric acid two to six grams to one liter of water; or nitrate of copper 10 to 20 grams, and lactate of ammonium five to ten grams to one liter of water; or borate of copper 5 to 15 grams, and boroglyceric acid two to six grams to one liter of water. The backing consists preferably of thin wire gauze rubbed with graphite, stretched together with the fabric in a stretching frame. When the current has acted sufficiently long, the fabric is washed and placed in an aqueous solution of chloride of tin and cyanide of potassium.

785,523, March 21, 1905. MACHINE FOR FORMING FLEXIBLE TUBING.—S. Scognamillo, New York. The machine comprises elements for regularly shaping an inner core or sustaining coil of resilient material, applying a casing composed of a spirally-bent metallic strip and shaping the latter in such a manner as to form interlocking joints and at the same time regularly feed a packing strip to the joints. The machine has a bed or support, a removable mandrel, a carriage moving longitudinal to the support below the mandrel and supporting bending and feeding devices, including bending rolls, an edge former and reels holding wire and a metal strip and a feed reel for feeding a package strip.

785,562, March 21, 1905.—COMPOSITION OF MATTER ENTERING INTO THE CONSTRUCTION OF FOUNDRY APPLIANCES.—A. R. Marsteller, St. Louis. The composition is to be used for foundry matches and dies, so as to produce a surface to which the sand of the drag or cope will not adhere, thus dispensing with parting sand. The composition consists of 10 lbs. coarse siliceous sand, 5 lbs. fine siliceous sand, 1 quart boiled linseed oil, ½ to 1 lb. litharge, ½ pint asphaltum. The materials are thoroughly mixed and kneeded and molded to the required configuration, after which the surface is brushed over with the asphaltum, preferably thinned with a proper proportion of turpentine. It is then thoroughly dried before a stove or steam radiator.

784,836, March 14, 1905. TINNING MACHINE.—D. D. Clarke, Newcastle, Pa. The machine consists of the vessel in which the molten tin is contained. The vessel has a bell mouth perforated conduit 2, by which the plates to be tinned are passed through



slot 4 in partition 3 into the extension 5 of the vessel 4. The plates pass through rollers, 6, 6, along which is arranged a sinous line of pipe 8, which maintains the palm oil floating on the molten metal at the proper degree of heat necessary for a perfect carrying out of the tinning operation.

786,185, March 28, 1905. PROCESS OF PRODUCING METALS AND ALLOYS.—H. S. Blackmore, Mount Vernon, N. Y. The process consists essentially in the fusion of an oxy compound of a metal or metals, which has greater affinity for oxygen than the metal desired; to this bath is added an oxy compound of the metal desired with another metal, which is intended to enter in an alloy with the former metal. The fused mass is then subjected to the action of an electrolytic current, which decomposes the bath and sets free the metals desired. The fusion of the bath is performed by an alternating current, separate and distinct from the direct current, which decomposes the bath. The bath is composed of oxides of calcium and lithium in varying proportions. For instance, in the production of aluminum copper alloys, the compound which is added to the bath and with which the latter is constantly replenished, consists of aluminate of copper, from which both the metals are liberated by the decomposing current with the production of the aluminum copper alloy. The current is passed between carbon anodes and the carbon bottom of the apparatus, which is partially covered with refractory lining, leaving conducting channels in which the alloy accumulates.

786,581, April 4, 1905. PROCESS OF TREATING METALLIC LEAD.—H. E. Miller, Oakland Cal. The process proposed for the treatment of commercial metallic lead to increase its capacity of withstanding the corrosive effect of acids and its resistance to other chemical changes consists in oxidizing about 95 per cent. of it to oxide. The oxide and the residue are then separated and the former converted again into metallic lead.

TRADE NEWS

Trade News of Interest Desired from All our Readers. Address THE METAL INDUSTRY, 61 Beekman St., New York.

The rolling mill of Randolph & Clowes, Waterbury, Conn., are building an addition to their casting shop.

Christian Brown, of Stamford, Conn., is building a new brass foundry 40 by 90, which will have a capacity of six furnaces.

One of the new metal industries of Rome, N. Y., is the Rome Electrical Company, which manufactures insulated copper wire.

W. W. Blaney, who has a smelting works in Boston, Mass., is casting copper anodes very successfully by the use of silicon-copper.

Philip Broomfield & Co., metal dealers of Boston Mass., have decided to build a new smelting plant in or near the city of Boston.

The firm of C. L. Berger & Sons, instrument makers, of Boston, Mass., have been making a number of aluminum instruments with steel wearing parts.

The Torrington Manufacturing Company, of Torrington, Conn., have been very busy for a number of months, running their plant until nine o'clock each night.

The Waterbury Crucible Company, of Waterbury, Conn., have begun to manufacture crucibles from No. 125 down. They will shortly be making larger sizes.

A. T. Salt, who has a silver and bronze foundry at Providence, R. I., reports that his business is increasing to such an extent that he is looking for larger quarters.

The Dorchester Brass and Aluminum Foundry has been established at Dorchester, Mass., to make a general line of brass foundry castings, automobile parts a specialty.

The Imperial Casting Rooms, of Providence, R. I., have bought out the Providence Jewelers' Casting Company and are at present engaged in making fine castings of silver and bronze.

The Turner Brass Works, of Chicago, Ill., are sending out cards, one side of which contains poetry and sketches, and the other side a map of Chicago, showing the location of the Turner factory.

The Forest City Brass Works, of Cleveland, Ohio, recently suffered a $10,000 loss by fire, but had their works under cover and resumed operations with a full force of men ten days after the blaze.

The Coe Brass Manufacturing Company, Torrington, Conn., recently received a verdict of no damages in the suit of Carmine Tedesco for $10,000 for injuries sustained while in the employ of the company.

The United States Brass & Specialty Company, of South Bend, Ind., which were recently incorporated, have their factory in full operation at Niles, Mich., and are manufacturing articles of brass and aluminum.

The Western Iron Works, of Los Angeles, Cal., manufacturers of gas engines, report that they shall increase the size of their plant that they may double their capacity, which at present is 200 engines a year.

The Legate Manufacturing Company, Hartford, Conn., have greatly increased the size of their store and are now carrying the goods of the leading silversmiths. They do a large local trade in plating.

The Isthmian Canal Commission will establish a purchasing depot in New York City. The commission is more or less a buyer of the products manufactured in non-ferrous metals and of kindred interests.

Arrangements have been completed by the Lazier Engine Company, builders of gas and gasoline engines, and the Du Bois Iron Works, of Du Bois, Pa., by which the gas engines will be built at the Du Bois works.

The E. H. H. Smith Silver Company, of Bridgeport, Conn., are putting a new design of flatware on the market which is very attractive. The ware is stamped from German silver and then given a substantial plate.

The Northwestern Shot and Lead Works, of St. Paul, Minn., report that they have secured this spring a number of large contracts for pig lead and done considerable business with the Board of Water Commissioners of St. Paul.

In addition to manufacturing lacquer and rouge the American Lacquer Company, of Bridgeport, Conn., have begun the manufacture of an anti-fouling paint for the bottom of boats which the company say is giving general satisfaction.

Some of the mills of the American Brass Company which during the past six months have been running 22 hours out of the 24, have stopped night work, being able to take care of the present business without working overtime.

The Waterbury Farrell Foundry & Machine Company, of Waterbury, Conn., report the sale of a number of their power sprue cutters to some of the big brass foundries. The cutters are particularly suitable for the larger foundries.

O. S. Platt, who has made all kinds of patterns at Bridgeport, Conn., for many years and who is a specialist on brass foundry patterns, reports a very active business. Mr. Platt has customers for his work as far away as San Francisco.

The United Foundry Company, of Cincinnati, Ohio, which was recently incorporated, succeeds the Johannigmann Foundry Company. The business will be continued, and the company have moved to McMicken and Dunlap streets, Cincinnati.

Dr. Murmann's aluminum alloys known as magnalium and zimalium can be obtained from the American agent F. B. Forster, 32 Park Place, New York City. Mr. Forster is also a manufacturer of silver paint for silver deposit work.

With a view of bringing its products to the attention of the Eastern plumbers the H. Mueller Manufacturing Company, of Decatur, Ill., have recently opened offices, stock and show rooms at the corner of Canal and Elm streets, New York City.

The Chicago Brass Company, Kenosha, Wis., state that the published announcement that $1,000,000 was to be spent in improving their plant was made without authority. The company have no building plans to make public at the present time.

James Bonar & Co., Incorporated, of Pittsburgh, Pa., are putting on the market their improved Bonar oil filters, separators and purifiers. The filter is substantially built of galvanized iron and heavy brass fittings. The filters are used in filtering impure waste oil.

The H. W. Rogers Plating Company have incorporated and will be known as the Rogers Plating & Foundry Company, having added a foundry, and will make light gray iron castings. The company will move to enlarged quarters at 15 Illinois street, Buffalo, N. Y.

The Turner Machine Company, of 2,049 North Second street, Philadelphia, Pa., announce that their molding machine is meeting with success in many of the leading foundries of the country.

TRADE NEWS

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It has a patent flask lifting and rapping attachment and does not need stripping plates.

By a recent ruling by General Appraiser Fischer, of New York, small metal baskets used for ornamental purposes are dutiable at 45 per cent. The importers claimed that they were toys and should be taxed 35 per cent. Mr. Fischer ruled that they were fancy goods.

The Gordon Metal Company, of Richmind, Va., which recently bought some water front property in that city, is making preparations for the erection of a model metal warehouse. Members of the firm have inspected the leading Northern metal firms before starting to build their plant.

The Ansonia Smelting and Metal Company, Inc., of Ansonia, Conn., have added four more brass molders to their shop. The Ansonia Brass Foundry Company, Ansonia, Conn., E. H. Wothemberg and W. A. Jenkins, proprietors, is another Ansonia foundry doing an active business.

The Waterbury Scrap Iron Company, Waterbury, Conn., have sold the site and building of their present works to the New York, New Haven & Hartford Railroad and will build a modern plant on Race street, where they will have a switch by which they can load and unload directly onto cars.

C. W. Moore, who has a smelting plant at 39 East Washington avenue, Bridgeport, Conn., is in the market for any quantity of brass skimmings and grindings and pays the highest market rates for such material. By dropping him a line his representative will call at once and examine the scrap material.

The Consolidated Car Heating Company, of New York, report that they have not torn down their old foundry at Albany, N. Y., but are putting up an addition to it. The building they did tear down was an old pipe shed which stood where they proposed to make a four-story addition to their present factory.

The New Era Lustre Company, of New Haven, Conn., manufacturers of all kinds of metal lacquers, are settled in the new addition to their factory and they report a brisk business. The company manufacture a number of brands of lacquer, each brand being suitable for the particular class of work.

Sealed proposals in triplicate will be received at the Frankford Arsenal, Philadelphia, Pa., until May 22d, for seamless brass and copper tubing, tin, zinc, lead and antimony, bronze and aluminum castings, cartridge metal, etc. Further information may be obtained of Lieut. Col. Frank Heath, commanding.

An effort is being made to unite the Pittsburgh Lamp, Brass and Glass Company, the Consolidated Lamp and Glass Company and the Phoenix Glass Company, all of Pittsburgh, and the Fosteria Glass Company of Moundsville, W. Va. If the combination takes place it will make a capital of several millions.

The Frictionless Metal Company, of Richmond, Va., are building at Chattanooga, Tenn., a plant that will give them an additional capacity of 25,000 pounds of metal a day. Their new plant will be thoroughly modern and up-to-date in every particular, and the company's main offices will be moved there on June 1st.

The Aluminum & White Metal Manufacturing Company, of 366 Broadway, New York City, report that after many years of experimenting they have succeded in plating aluminum with either gold or silver and are ready to put plated aluminum novelties on the market. They are also doing plating in all metals for the jewelry trade.

The Bridgeport Wire Goods Company, of Bridgeport, have been organized to act as sole selling agents for the Metal Ware Manufacturing Company. Their Bridgeport office is 172 Golden Hill street and New York office, 82 West Broadway. They have put on the market a line of wire kitchen utensils and housefurnishing ware.

The Douglas & Lomason Company, of Detroit, Mich., announce that they are thoroughly equipped for the most prompt service in turning out metal stamping, pressing, punching, drilling, turning, grinding, polishing and electro-plating. Die sinking is a specialty of theirs. Further particulars may be obtained from the company.

The Danzer Metal Works, of Hagerstown, Md., will build an addition to their shop which, when completed, will give them 40 square feet more of space. The Danzer sheet metal tools are sold by the McClure Company, 301 Florist street, Philadelphia, Pa., and include a foot power edger, hand power edger and other sheet metal working tools.

The American Steam Gauge Company, of Boston, Mass., have just finished a fine line of locomotive pop valves and steam gauges which are to be exhibited at the International Railroad Congress held in the city of Washington May 4th-14th. The valves and gauges show the fine brass founding and finishing which is done by this company.

E. H. Munford and C. S. Lovell, formerly of the Tabor Manufacturing Company, of Philadelphia,, Pa., have formed the E. H. Mumford Company for the manufacture of molding machines. The company will aim to build a molding machine simple in construction and operation, and their business will be carried on at 17th and Callowhill streets, Philadelphia, Pa.

P. McLaughlin's Sons Company, of 230 N. 12th street, Brooklyn, N. Y., have held their annual meeting and report a good business. The firm was established in 1870, incorporated in 1903. They are manufacturers, refiners and dealers in the nonferrous metals and their capacity is 20,000 pounds daily of spelter, ingot brass, lead type metal, solder, etc.

T. F. Fallon, who for seventeen years was with the Fred Byron Brass Foundry at Lawrence, Mass., has started in business for himself at 156 South Broadway, in the same city, under the title of T. F. Fallon & Co. The firm will make brass, composition, phosphor bronze and aluminum castings. The new foundry was equipped by Cutter, Wood & Stevens through their Providence agent, W. T. Nicholson.

H. H. Hewitt, of the Magnus Metal Company, has recently bought 1,800 feet of ground fronting on the Belt Line tracks near Buffalo, N. Y., where he will erect a model brass manufacturing plant into which will be moved the machinery of the Magnus Metal Company, now located at Depew. The Depew plant will then be rented or sold, as it is Mr. Hewitt's intention to have his Buffalo interests under one roof.

The Victor Metals Company, of East Braintree, Mass., have recently been turning out some large Government work, including propellers 7 feet in diameter and weighing 12,000 pounds each for torpedo boats Nicholas and O'Brien. Another casting was a 3,000 pound conning tower for the submarine boat Fulton. All of the Government castings were made in the company's alloy which they call "Victor Bronze."

The main sales offices of the Bridgeport Brass Company have been for the past 24 years at 19 Murray street. On May first the company moved into a fine suite of offices in the Postal Telegraph Building at the corner of Broadway and Murray street. The new offices will be the general headquarters of the selling department, and Mr. W. F. Malloy, secretary of the company will have his principal offices at this address.

TRADE NEWS

Trade News of Interest Desired from All of our Readers. Address THE METAL INDUSTRY, 61 Beekman St., New York.

In addition to buying and selling all kinds of metals the firm of Walsh's Sons & Co., of Newark, N. J., are putting on the market a portable manger which is particularly useful for truck horses. As most all large metal manufacturers do considerable trucking it will pay them to investigate the merits of the Walsh manger. It has a light steel frame and canvass body and is an improvement in the shape of manger ordinarily used.

The McAdamite Foundries Company, with offices at 179 Broadway, New York City, and foundry at New Brighton, Staten Island, N. Y., announce that their McAdamite metal castings are suitable for many parts of automobiles, auto boats and of machines and appliances where lightness and strength is desired. Further particulars of the McAdamite metal castings, which are made from an aluminum alloy, may be obtained of the company.

The Mohawk Smelting and Refining Works, of Utica, N. Y., Ellis & Ross, proprietors, have started to build their new smelting plant, which will be a one-story brick building 70 x 40. When completed, which will be in May, the company will have a number of furnaces in operation on red metal, spelter and solder. They expect to get a great deal of the metal trade of central New York, as they are the only smelting works located in that part of the State.

The Charles Graham Chemical Pottery Works, 986 Metropolitan avenue, Brooklyn, N. Y., have put in another kiln and now have eight in operation. The works report that they are the only manufacturers of large pickling tanks, and that these tanks are of superior quality, withstanding the actions of acids indefinitely. A great variety of stoneware, a good part of which is particularly suitable for the uses of platers, is made by the Graham Works.

On May 9th, 16th and 23d the Bureau of Supplies and Accounts of the Navy Department, Washington, D. C., will receive proposals for various supplies. Among the material specified are kitchen utensils, motors, locks, brass chain, thimbles, brass and copper tubing, cocks, toilet articles, hardware, machinery, metallic phosphoro, ingot copper, pig tin, phosphor and Tobin bronze, brass pipe and various other articles manufactured by the nonferrous metal industry and kindred interests.

The Hanson & Van Winkle Company have established at their Newark works a model planing plant which is in operation and open for the inspection of visitors. This plant comprises the latest dynamos, up-to-date wiring and appliances used in the electro-deposition of metals. The visitor can witness all operations in plating or receive instructions in laying out or operating a plating plant or follow a batch of his own work being finished in the mechanical outfit. A description of this outfit was published in the April number of THE METAL INDUSTRY.

The Wellman-Seaver-Morgan Company, with main office and works at Cleveland, Ohio, anonuces that George B. Damon, who has been manager of their New York office, has been transferred to an important position in connection with the engineering and sales department at Cleveland, Ohio, and that W. A. Stadelman, for the past ten years manager of the Eastern office of the Brown Hoisting Machinery Company, has become manager of the general Eastern office of the Wellman-Seaver-Morgan Company with offices at No. 42 Broadway, New York City.

Richards & Co., of Boston, Mass., now have their new warehouse at Beverly and Causeway streets in model shape. All of their metals are stored on two floors, the basement and street floor, and the company have all of the latest facilities for storing and handling them. They have always in stock and ready for immediate shipment every metal that the brass founder needs and also a large stock of sheet brass and copper, the firm being agents for the Detroit Copper & Brass Rolling Mills. They also have a room for visitors, where their out-of-town customers may make themselves at home when visiting Boston.

The plant of the Hartford Machine Screw Company, Hartford, Conn., has been sold to the Standard Screw Company, of Detroit, Michigan; also the plant of the Western Automatic Machine Screw Company, of Elyria, Ohio, which was a branch of the Hartford. The Standard Screw Company will now take in most of the large screw manufacturers of the country. If any change is made in the Hartford works it will be probably to enlarge them. The factory is at present running day and night. Mr. P. B. Gale, who has been manager several years of the Detroit Screw Works, will be manager of the Hartford.

The T. F. Tuttle Silver Company, Inc., have been incorporated under the Masachusetts laws with the following officers: Charles A. Gleason, president; T. Frank Tuttle, vice-president and general manager; H. Clifford Brown, secretary and treasurer. The company have equipped a large factory in Malden, having four times the floor space of the old silver company with the same name, and maintain a Boston office at 21 Bromfield street for quick repair work. The Tuttle people aim to manufacture the best goods in silver, britannia, copper and brass and expect with their increased facilities to turn out high class work at moderate prices.

PERSONAL

William F. Nicholson, Jr., has been appointed New England agent for the Waterbury Crucible Company, of Waterbury, Conn., with headquarters at Providence, R. I.

E. C. Lott, manager of the Chicago district of the American Steel and Wire Company, has resigned to enter the real estate business, and F. C. Gedge has taken his place.

Isaac Taylor, who has been employed as foreman of the Textile Machinery Company's brass foundry at Providence, R. I., has resigned and has become foreman with the Allen Fire Department Supply Company of the same city. William McGrail, formerly of the Allen Company has become foreman of the Textile company's foundry.

MEETINGS

At the annual meeting of the Joseph Dixon Crucible Company the board of directors re-elected the former officers, namely, Edw. F. C. Young, president; John A. Walker, vice-president and treasurer; George E. Long, secretary. Judge Joseph D. Bedle was also re-elected as counsel. The stockholders present expressed themselves as thoroughly satisfied with the management of the company by its officers. Of the total number, 7,345 shares, there were represented 7,145 shares.

At the annual meeting of the National Lead Company held the last of April in Jersey City, President L. A. Cole presented a report showing assets of more than $33,000,000 and a surplus of $2,515,244 on December 31st last. During the year 1904 dividends amounting to $1,043,280 were paid. It was stated that no action was taken at the meeting regarding the proposed alliance of the National Lead Company and the United Lead Company.

At the annual meeting of the Whiting Manufacturing Company, held recently in New York, the following officers were elected: President, Harold H. Hamilton; vice-president, Charles

TRADE NEWS

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Osborn; secretary-treasurer, George E. Wells. The only officer re-elected was Mr. Osborn. Mr. Hamilton, the new president, was with the William B. Durgin Company for nineteen years, and Mr. Wells, the new secretary-treasurer, was connected for a score of years with the Gorham Manufacturing Company. The management declares that the company's independence is not at all affected by the fact that some of the stock of outgoing officers has been purchased by the Gorham Manufacturing Company and state that the plant will be continued as an entirely separate enterprise.

AMERICAN FOUNDRYMEN'S ASSOCIATION.

The eighth convention of the American Foundrymen's Association will be held this year in New York City June 6th, 7th, 8th and possibly the 9th. Arrangements are being made for headquarters, hotel accommodations, reduced railroad rates, etc., and an announcement of these arrangements will be made later. Secretary Richard Moldenke reports that the indications are for a large attendance and that a number of interesting papers have been promised. Special pains will be taken to care for the ladies, and they are cordially invited.

THE NEW YORK METAL EXCHANGE.

At the annual meeting of the New York Metal Exchange held April 3 the following officers were re-elcted; President, Robert M. Thompson; vice-president, Adolph Lewissohn; treasurer, Robert L. Crooke; secretary, Carl Mayer; members of the Board of Managers, B. Rothschild, American Metal Company, Limited; H. W. Hendricks, Hendricks Brothers; L. Nachmann; G. E. Behr, Behr & Steiner; William Jay Ives; George W. Jaques; J. H. Lang, National Lead Company; L. Vogelstein; Arbitration Committee, Edmund Hendricks, Hendricks Brothers; Morton B. Smith, M. B. Smith Company; J. Mitchell Clark, Naylor & Co.; E. A. Caswell; N. M. Macdonald, Vivian, Bond & Co.

METAL MARKET REVIEW

COPPER.—The easier tone of the copper market, noted in our review of a month ago, has resulted in a reduction of all grades of copper nearly half a cent a pound. Consumers are holding off as long as possible, production is rapidly increasing, and the export demand continues to be more or less disappointing. We pointed out last month that China is no longer an active factor and recent indications are that the Chinese have rather over bought the market, and, in some instances, have turned sellers. The exports for the month of April were slightly over 22,000 tons against 13,983 tons for the same month last year, the total exports for the first quarter of 1905 amount to 81,826 tons against 82,993 for the same period 1904. Conditions abroad do not, at present, point to a continuation of the heavy exports of last year. The consumption of copper in Germany for January and February of 1905 were 13,947 tons against 18,563 tons in 1904. Before very long Japan will be a seller of copper and with the new and up-to-date mining appliances lately imported, she is likely to prove a dangerous competitor in the foreign market. Conditions here are good, but the price of copper is considered high and consumers feel justified in holding off. The market quotations for Lake are 15 cents to 15¼ for carload lots, 15¼ to 15½ for smaller lots, prime brands. Electrolytic 15 to 15¼; small lots, 15⅜ to 15½. Casting brands 14¾ to 15, carload; small lots 15 cents. London prices for G. M. B.'s have steadily declined, closing on the last day of April at £65, 15s. spot against £67, 5s. in the first of the month.

TIN.—The New York tin market has held fairly steady through the squeeze and the consequent high prices in the London market. Prices here have ranged from 30¾ to 31¼, and at the close of the month the market is firm at 30⅜ cents, 5 ton lots, 30.40 smaller lots. In the London market, spot tin was run up to £145, 10s. on the 18th, followed by a break of £4 10s. and a decline to £138, 6s., closing at the end of April at £139.

LEAD.—The market has remained steady with a fair demand and prices are unchanged. New York delivery carload lots, 4.50, smaller lots, 4⅝ to 4¾ cents.

SPELTER.—The market after advancing about ⅛ cent has lately eased off again and prices are lower and inclined to sag. Carload lots New York, 5.82½ to 5.85, smaller lots 6.00 cents.

OLD METALS.—The market has been dull and prices are a shade lower. There has been a fair demand for good heavy copper, but the other metals and drosses have declined.

TRADE WANTS

ANSWERS SENT IN OUR CARE WILL BE FORWARDED.

WANTED—In any quantity or quality or in any form old bismuth, nickel, platinum, mercury, gas mantel waste and bronze powder, nickel anode waste, etc. JOSEPH RADNAI, 331 East 80th street, New York City.

POSITION WANTED as FOREMAN by an art founder. Understands thoroughly green and French sand molding and the cire perdue process. Has new ideas about molding which will save labor in a foundry. Is modern and up-to-date. Address MOLDER, care THE METAL INDUSTRY.

POSITION wanted as foreman caster or roller in a German silver foundry or rolling mill. Also understands the casting and rolling of sterling silver. Have had 20 years' experience. Address GERMAN SILVER, care THE METAL INDUSTRY.

WANTED—An experienced smelter of ALUMINUM, one who knows how to smelt borings, turnings and scrap with the least shrinkage. State experience and salary wanted. Address ILLINOIS SMELTING & REFINING CO., 122 North Peoria street, Chicago, Ill.

PARTY owning the controlling interest of one of the oldest established companies manufacturing lamps, clocks, bronzes and novelties in spelter and white metal, desires to retire and will sell all or part interest. Excellent opportunity to acquire a very progressive business. $15,000 to $25,000 needed. Factory within two hours of New York City. Address MANUFACTURER, care THE METAL INDUSTRY, 61 Beekman street, New York City, N. Y.

POSITION WANTED by experienced chemist in brass and bronze, white and bearing metals, alloys, assay of tin, lead and zinc drosses and all that class of non-ferrous material. Address, Chemist, 3811 Pier Street, Pittsburgh, Pa.

WANTED—Alloys that will withstand the action of sulphuric acid of 55° Be. and 8° to 30° Be. at 70° F. Peter T. Austen, 89 Pine Street, New York.

A PLATER with a shop which has been established six years in a good western city would like to associate himself with a good reliable experienced gold and silver plater and burnisher. $2,000 required. Your experience is more essential than money. Address PLATER, THE METAL INDUSTRY.

A PRACTICAL BRASS MOULDER, having from twelve to fifteen hundred dollars can purchase one of the best jobbing brass foundries in one of the leading cities of Ohio. Business established several years. Splendid contracts paying good prices. Reason for selling, owners have other interest that demands their attention. Address B. B. F., care METAL INDUSTRY.

PATENT FOR SALE of an oil brazing furnace. Will braze all metals, including cast iron. The furnace can be manufactured at comparatively low cost and brazes at less cost than a gasoline or gas brazing furnace. For further particulars address THE METAL INDUSTRY.

INFORMATION BUREAU.

Subscribers intending to purchase metals, machinery and supplies and desiring the names of the various manufacturers and sellers of these products can obtain the desired information by writing to THE METAL INDUSTRY. Our Information Bureau is for the purpose of answering questions of all kinds. Send for circular.

Metal Prices, May 3, 1905

METALS

	Price per lb.
Tin—Duty Free.	
Straits of Malacca	30.00
Copper, Pig, Bar and Ingot and Old Copper—Duty Free. Manufactured 2½c. per lb.	
Lake	15.00
Electrolytic	15.00
Casting	14.75
Spelter—Duty 1½c. per lb.	
Western	5.80
Lead—Duty Pigs, Bars and Old 2⅛c. per lb.; pipe and sheets 2½c. per lb.	
Pig Lead	4.60
Aluminum—Duty Crude, 8c. per lb. Plates, sheets, bars and rods 13c. per lb.	
Small lots	37.00
100 lb. lots	35.00
1,000 lb. lots	34.00
Ton lots	33.00
Antimony—Duty ¾c. per lb.	
Cooksons	9.00
Hallets	9.00
Other	8.75
Nickel—Duty 6c. per lb.	
Large lots	45 to 50
Small lots	50 to 75
Bismuth—Duty Free	$1.50 to $2.00
Phosphorus—Duty 18c. per lb.	
Large lots	45
Small lots	65 to 75
	Price per oz.
Silver—Duty Free—Commercial Bars	$0.58
Platinum—Duty Free	19.00
Gold—Duty Free	20.00
Quicksilver—Duty 7c. per lb. Price per Flask	40.00

Zinc—Duty, Sheet, 2c. per lb. 600-lb. casks, 8.00 per lb., open, 8.50 per lb.

Tobin Bronze—Rods, Unfinished, 19c.

Tobin Bronze—Rods, Finished, 20c.

PRICE FOR ALUMINUM BRONZE INGOTS.

	Per pound.
2½ per cent	19c.
5 per cent	19½c.
7½ per cent	20½c.
10 per cent	21½c.

Manganese Bronze, Ingots	16 to 17c.
Phosphor Bronze, Ingots	16 to 20c.
Silicon-Copper, Ingots	32 to 36c.

OLD METALS

Heavy Cut Copper	13.25c.	14.50c.
Copper Wire	13.00c.	14.25c.
Light Copper	11.75c.	13.00c.
Heavy Mach. Comp	11.00c.	12.25c.
Heavy Brass	8.25c.	9.50c.
Light Brass	7.00c.	8.00c.
No. 1 Yellow Brass Turnings	8.00c.	8.75c.
No. 1 Comp. Turnings	10.00c.	11.00c.
Heavy Lead	4.00c.	4.35c.
Zinc Scrap	4.25c.	4.75c.
Scrap Aluminum, sheet, pure	22.00c.	25.00c.
Scrap Aluminum, cast, alloyed	12.00c.	18.00c.
Old Nickel	15.00c.	25.00c.
No. 1 Pewter	20.00c.	21.00c.

PRICES OF SHEET COPPER

Sizes of Sheets.		96oz. & over 75 lb. sheet 30x60 and heavier	64oz. to 96oz. 50 to 75 lb. sheet 30x60	32oz. to 64oz. 25 to 50 lb. sheet 30x60	24oz. to 32oz. 18¾ to 25 lb. sheet 30x60	16oz. to 24oz. 12½ to 18¾ lb. sheet 30x60	14oz. and 15oz. 11 to 12½ lb sheet 30x60
		Cents per pound.					
Not wider than 30 ins.	Not longer than 72 ins.	19	19	19	19	19	20
	Longer than 72 ins. Not longer than 96 ins.	19	19	19	19	19	20
	Longer than 96 ins.	19	19	19	19	19	21
Wider than 30 ins. but not wider than 36 ins.	Not longer than 72 ins.	19	19	19	19	19	21
	Longer than 72 ins. Not longer than 96 ins.	19	19	19	19	19	21
	Longer than 96 ins. Not longer than 120 ins.	19	19	19	19	20	22
	Longer than 120 ins	19	19	19	20	21	
Wider than 36 ins. but not wider than 48 ins.	Not longer than 72 ins.	19	19	19	20	21	23
	Longer than 72 ins. Not longer than 96 ins.	19	19	19	20	22	24
	Longer than 96 ins. Not longer than 120 ins.	19	19	19	21	23	27
	Longer than 120 ins.	19	19	20	22	25	
Wider than 48 ins. but not wider than 60 ins.	Not longer than 72 ins.	19	19	19	20	22	25
	Longer than 72 ins. Not longer than 96 ins.	19	19	19	21	23	28
	Longer than 96 ins. Not longer than 120 ins.	19	19	20	22	25	
	Longer than 120 ins	20	20	21	23	27	
Wider than 60 ins. but not wider than 72 ins.	Not longer than 96 ins.	19	19	20	22	27	
	Longer than 96 ins. Not longer than 120 ins.	19	19	21	24	29	
	Longer than 120 ins.	20	20	22	27		
Wider than 72 ins. but not wider than 108 ins.	Not longer than 96 ins.	20	20	22	25		
	Longer than 96 ins. Not longer than 120 ins.	21	21	23	26		
	Longer than 120 ins.	22	22	24	28		
Wider than 108 ins.	Not longer than 132 ins.	23	23	25			
	Longer than 132 ins.	24	24	27			

Rolled Round Copper, ⅜ inch diameter or over, 19 cents per pound. (Cold Drawn, Square and Special Shapes, extra.)

Circles, Segments and Pattern Sheets three (3) cents per pound advance over prices of Sheet Copper required to cut them from.

All Cold or Hard Rolled Copper, 14 ounces per square foot and heavier, one (1) cent per pound over the foregoing prices.

All Cold or Hard Rolled Copper, lighter than 14 ounces per square foot, two (2) cents per pound over the foregoing prices.

Cold Rolled and Annealed Copper, Sheets and Circles, wider than 17 inches, take the same price as Cold or Hard Rolled Copper of corresponding dimensions and thickness

All Polished Copper, 20 inches wide and under, one (1) cent per pound advance over the price for Cold Rolled Copper.

All Polished Copper, over 20 inches wide, two (2) cents per pound advance over the price for Cold Rolled Copper.

Planished Copper, one (1) cent per pound more than Polished Copper.

Cold Rolled Copper prepared suitable for polishing, same prices and extras as Polished Copper.

Tinning Sheets, on one side, 2½c. per square foot.

For tinning both sides, double the above price.

For tinning the edge of sheets, one or both sides, price shall be the same as for tinning all of one side of the specified sheet.

Metal Prices, May 3, 1905

Net Cash Prices.

COPPER BOTTOMS, PITS AND FLATS.

14 oz. to square foot, and heavier, per lb..... 23c.
Lighter than 10 oz..... 29c.
10 oz. and up to 12 oz..... 26c.
12 oz. and up to 14 oz. to square foot, per lb..... 24c.
Circles less than 8 in. diam., 2c. per lb. additional.
Circles over 13 in. diam. are not classed as Copper Bottoms.
Polished Copper Bottoms and Flats, 1c. per lb. extra.

PRICE LIST FOR ROLL AND SHEET BRASS

Prices are for 100 lbs. or more of sheet metal in one order. Brown & Sharpe's Gauge the Standard.

Common High Brass	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.
Wider than and including	2 12	12 14	14 16	16 18	18 20	20 22	22 24	24 26	26 28	28 30
To No. 20 inclusive..	.22	.23	.25	.27	.29	.31	.33	.36	.39	.42
Nos. 21, 22, 23 and 24	.22	.24	.26	.28	.30	.32	.34	.37	.40	.43
Nos. 25 and 26.....	.23	.24½	.27	.29	.31	.33	.35	.38	.41	.44
Nos. 27 and 28.....	.23	.25	.28	.30	.32	.34	.36	.39	.42	.45

Add ½ cent per lb. additional for each number thinner than Nos. 28 to 38, inclusive.

Add 7 cents per lb. for sheets cut to particular lengths, not sawed, of proportionate width.

Add for polishing on one side, 40 cents per square foot; on both sides, double this price.

Brazing, Spinning and Spring Brass, 1 cent more than Common High Brass.

Extra Quality Brazing, Spinning and Spring Brass, 2 cents more than Common High Brass.

Low Brass, 4 cents per lb. more than Common High Brass.

Gilding, Rich Gold Medal and Bronze, 7 cents per lb. more than Common High Brass.

Discount from List, 30 per cent.

PRICE LIST FOR BRASS AND COPPER WIRE

BROWN & SHARPE'S GAUGE THE STANDARD.	Com. High Brass	Low Brass	Gilding Bronze and Copper
All Nos. to No. 10, Inc	$0.23	$0.27	$0.28
Above No. 10 to No. 16.....	.23½	.27½	.28½
Nos. 17 and 18.....	.24	.28	.32
" 19 and 20.....	.25	.29	.33
No. 21.....	.26	.30	.34
" 22.....	.27	.31	.35
" 23.....	.28	.32	.36
" 24.....	.30	.34	.38

Discount, Brass Wire, 30 per cent.; Copper Wire, 30 per cent.

PRICES FOR SEAMLESS BRASS TUBING.

From 1¼ in. to 8½ in. O. D. Nos. 4 to 13 Stubs Gauge, 20c. per lb.
Seamless Copper Tubing, 23c. per lb.
For other sizes see Manufacturers' List.

PRICES FOR SEAMLESS BRASS TUBING Iron Pipe Sizes.

Iron Pipe size.....	⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4	4½	5	6
Price per lb.....	28	27	22	21	20	20	20	20	20	20	20	21	22	24	26	27

BRAZED BRASS TUBING

Brown & Sharpe's Gauge the Standard.

											Per lb
Plain	Round	Tube,	¾	in.	up	to	2	in.,	to No.	19,	inc.	$0 35
"	"	"	⅞	"	"		2½	"	"	19,	"	36
"	"	"	1	"	"		2⅝	"	"	19,	"	38
"	"	"	1⅛	"	"		2¾	"	"	19,	"	41
"	"	"	1¼	"	"		2⅞	"	"	19,	"	48
"	"	"	1½	"	"		3	"	"	19,	"	65
"	"	"	1⅝	"	"		3½	"	"	19,	"	1 00
"	"	"	1¾	"	"		4	"	"	19,	"	1 50
Smaller than ⅛ inch												**Special**
⅛ inch to 3 inch, to No. 19, inclusive												**38**
3 inch												**40**
Over 3 inch to 3¼ inch												**45**
Over 3¼ inch												**50**

Bronze and copper advance 3 cents. Discount 35 per cent.

PRICE LIST FOR SHEET ALUMINUM—B. & S. Gauge.

Wider than and including	3 in. 12 in. in coils	6 in. 14 in.	14 in. 16 in.	16 in. 18 in.	18 in. 20 in.	20 in. 24 in.	24 in. 30 in.	30 in. 36 in.	36 in. 40 in	Cutting to Length.	Polishing or Satin Finishing One side.
No. 13	42	42	44	44	44	44	47	47	47	1	2
" 14	42	42	44	44	44	44	47	47	47	1	2
" 15	42	42	44	44	44	44	47	47	47	1	2
" 16	42	42	44	44	44	44	47	47	47	1	2
17	42	42	44	44	44	44	47	47	47	1	3
" 18	42	42	44	44	44	44	47	47	50	1	3
" 19	42	42	44	44	44	44	47	48	51	1	4
" 20	42	44	44	44	44	46	49	50	52	1	4
" 21	42	46	46	46	46	48	51	52	58	2	5
" 22	42	46	46	46	48	48	51	55	59	2	5
" 23	42	46	46	46	48	48	51	57	60	2	6
" 24	42	46	48	50	50	50	53	59	62	2	6
" 25	44	47	49	51	51	51	54	61	65	2	7
" 26	44	47	50	54	54	54	59	63	69	2	8
" 27	44	48	52	56	56	57	62	66	72	2	10
" 28	44	48	54	56	57	57	64	70	75	2	11
" 29	46	49	56	58	60	60	69	75	80	2	13
" 30	46	50	58	60	64	70	77	80	85	2	15
" 31	48	52	60	63	68	76	79	82	88	3	17
" 32	50	54	62	66	74	82	89	95	100	3	19
" 33	52	56	65	70	78	89	96	05	115	3	21
" 34	55	60	67	75	83	96	108	115	125	3	25
" 35	.....	70	75	85	95	105	120	130	.....	.....	Polished or Scratch Brushed 2 sides double above prices.
" 36	.....	85	95	105	120	125	140	.....	.....	.....	
" 37	.....	100	110	125	140	155	170	.....	.....	.....	
" 38	.....	120	135	150	165	180	200	.....	.....	.....	
" 39	.....	140	160	180	200	220	.....	.....	.....	.....	
" 40	.....	170	200	220	240	.....	.....	.....	.....	.....	

In flat rolled sheets the above prices refer to lengths between 2 and 8 feet. Prices furnished by the manufacturers for wider and narrower sheeet. All columns except the first refer to flat rolled sheet. Prices are for 50 lbs. or more at one time. Less quantities 5c. lb. extra. Charges made for boxing.

Discounts as Follows are Given for Sheet Orders Over 200 Pounds.

200 to 1,000 pounds.....10 per cent. off list.
1,000 to 2,000 " ..... 10 per cent. and 2 " "
2,000 to 4,000 " ..... 10 " " 3 " "
4,000 pounds and over ..... 10 " " 5 " "

PRICE LIST OF SEAMLESS ALUMINUM TUBING—STUBS' GAUGE.

STUBS' G.	1-4"	3-8"	1-2"	5-8"	3-4"	1"	1 1-2"	2"	2 1-2"	2 3-4"
4 to 11	.....	.....	96	86	83	77	67	61	61	61
12	.....	1 08	96	86	83	77	67	61	61	61
13	.....	1 08	96	86	83	77	67	64	64	64
14	.....	1 08	96	86	83	77	67	64	64	64
15	.....	1 12	96	89	86	80	70	67	67	67
16	.....	1 15	99	93	89	83	70	70	70	70
17	.....	1 18	1 02	96	93	86	73	73	73	73
18	1 85	1 24	1 05	99	93	86	77	77	77	80
19	1 88	1 28	1 08	1 02	99	93	83	86	80	83
20	1 95	1 31	1 15	1 08	1 05	99	89	86	86	89
21	2 01	1 37	1 21	1 15	1 12	1 05	99	93	93	96
22	2 17	1 44	1 24	1 18	1 15	1 08	1 05	99	1 05	1 05
23	2 35	1 50	1 31	1 24	1 21	1 15	1 15	1 08	1 15	1 15
24	2 48	1 60	1 37	1 31	1 28	1 18	1 21	1 21	1 24	.....
25	2 65	1 69	1 47	1 37	1 34	1 28	1 34	.....	.....	.....

Prices are for lots of 10 to 20 lbs. Boxing extra. Smaller, larger and intermediate sizes furnished by manufacturers.

Discounts as Follows are Given for Tube Orders Over 50 Pounds.

50 to 200 lbs..... 5 per cent. discount off list
200 to 2,000 lbs.....10 " " " " "
2,000 to 4,000 lbs.....10 and 3 " " " " "
4,000 lbs. and over.....10 and 5 " " " " "

PRICE LIST FOR ALUMINUM ROD AND WIRE—B. & S. GAUGE.

Diameter B. & S. G'ge.	0000 to No. 10	No. 11.	No. 12.	No. 13.	No. 14.	No. 15.	No. 16.	No. 17.	No. 18.	No. 19.	No. 20.	No. 21.	No. 22.
Price per lb	$ 38	38½	38½	0 39	39½	0 40	40½	0 41	0 42	0 43	0 44	0 47	0 52

200 lbs. to 30,000 lbs., 3 cents off list; 30,000 lbs. and over, 4 cents off list.

PRICE LIST FOR GERMAN SILVER IN SHEETS AND ROLLS.

Per cent.	Price per lb.	Per cent.	Price per lb.
12.....	$0.52	16.....	.58
13.....	.53	17.....	.59
14.....	.54	18.....	.60
15.....	.55		

These prices are for sheets and rolls over 2 inches in width, to and including 8 inches in width and to No. 20, inclusive, American or Brown & Sharpe's Gauge. Prices are for 100 lbs. or more of one size and gauge in one order. Discount 50 per cent.